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*Supporting information for*

# Visible-Light Induced Cross-Electrophile Coupling of Imines and Anhydrides to Synthesize α-Amino Ketones

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## General methods and materials

**Reagents** were purchased from commercial suppliers and used as received unless noted otherwise. The Hantzsch ester (HE)[1] was synthesized according to reported procedures.
**Reactions** were carried out in dry glassware under a nitrogen atmosphere. For this, the glassware was dried by heat gun under high vacuum (oil pump, 0.1 mbar), cooled to room temperature and backfilled with nitrogen. For the addition of solvents and reagents, syringes and cannula were flushed with nitrogen at least three times before use. All yields are isolated yields, unless otherwise stated. For optimization studies in catalytic reactions, yields were determined from the $^{1}$H-NMR spectrum of the crude product using 1,3,5-trimethoxybenzene as an internal standard, unless noted otherwise. The progress of the reactions was monitored by thin layer chromatography using TLC plates.
**Solvents:** DMA, DMF, DCM, THF, MeCN and DMSO, were freshly distilled over calcium hydride. Unless otherwise noted, all commercially available reagents were used without further purification. All other reagents were purchased from various commercial sources and used as received.
**Thin layer chromatography** (**TLC**) was purchased from commercial suppliers. Compounds were visualized using UV light ($\lambda$ = 254 nm) or by applying common staining solution and heating:
$KMnO_4$ stain: $KMnO_4$ (3.0 g), $Na_2CO_3$ (20 g), aq. NaOH solution (5 % w/v, 5.0 mL) in $H_2O$ (300 mL).
Ninhydrin stain: ninhydrin (1.5 g), acetic acid (3.0 mL) in *n*-Butanol (100 mL).
DNP stain: 2,4-dinitrophenylhydrazine (12 g), Conc. $H_2SO_4$ (60 mL) in EtOH (200 mL) and $H_2O$ (80 mL).
**Flash column chromatography** was carried out using standard glass columns packed with a plug of cotton wool, silica gel (200-300 mesh) and $Na_2SO_4$ (1-2 cm).
**Melting points** (Mp.) were determined on a Mel-TEMP II apparatus and are uncorrected.
**Nuclear magnetic resonance (NMR)** spectra were measured on a Bruker 400 MHz Fourier transform spectrometers and Bruker 600 MHz Fourier transform spectrometers at East China University of Science and Technology Analytical Testing Centre. $^{1}$H-NMR spectra were measured at 400 or 600 MHz, $^{13}$C-NMR spectra were measured at 101 or 151 MHz, $^{19}$F-NMR spectra were measure at 377 or 565 MHz. All signals are referenced to the signal of the deuterated solvent ($^{1}$H-NMR: $CDCl_3$, $\delta$ = 7.26 ppm; $^{13}$C-

NMR: $CDCl_3$, $\delta = 77.1$ ppm). NMR data are reported as follows: chemical shift (δ/ppm), multiplicity (s: singlet; d: doublet; t: triplet; q: quartett; p: pentett; m: multiplet; brs: broad signal), coupling constants (J/Hz), integration.

**High resolution mass spectrometry (HRMS)** was performed with a HP1100 LC-MS spectrometer at East China University of Science and Technology Analytical Testing Centre.

**Stern-Volmer** quenching experiments were performed using a PerkinElmer LS55 Fluorescence Spectrometer.

**Reaction Setup** A reaction setup containing a 0.6 W, 50 Blue LEDs strip as light source and a case fan as cooling system was used to run the catalysis, see **Figure 1**.

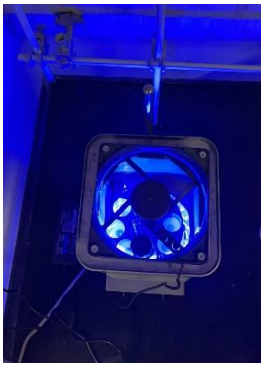
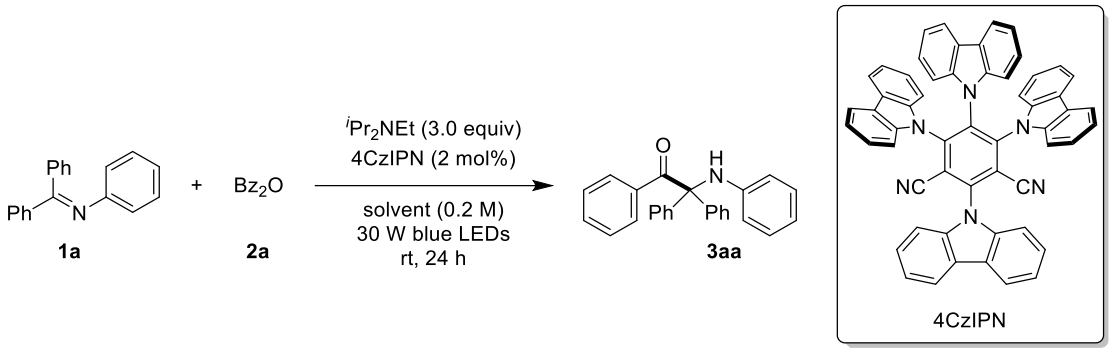


**Figure 1**. Reaction setup containing blue LED strips and a case fan.

## Optimization studies

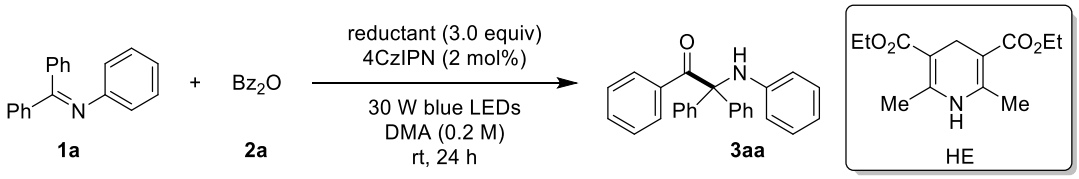
**Table S1**: Screening solvents in cross-electrophile coupling reaction




| Entry[a] | Solvent | Yield (%)[b] |
|---|---|---|
| 1 | THF | 10 |
| 2 | $CH_2Cl_2$ | 30 |
| 3 | DMSO | 25 |
| 4 | ACN | 30 |
| 5 | DMF | 18 |
| **6** | **DMA** | **32** |

[a] Reaction conditions: **1a** (0.2 mmol), **2a** (2.0 equiv), $^{i}Pr_2NEt$ (3.0 equiv) and 4CzIPN (2 mol%) in solvent (1 mL) at rt. The reaction was carried out with blue LEDs in 24 h. [b] Determined by NMR using 1,3,5-trimethoxybenzene as the internal standard.

**Table S2**: Screening reductant in cross-electrophile coupling reaction

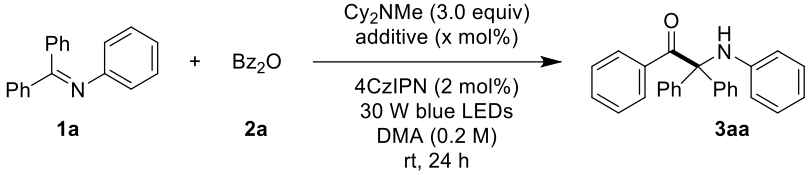



| Entry[a] | Reductant | Yield (%)[b] |
|---|---|---|
| 1 | $Et_3N$ | 41 |
| 2 | HE | 41 |
| 3 | *n*-$Bu_3N$ | 38 |
| **4** | **$Cy_2NMe$** | **53** |

| | | |
|---|---|---|
| 5 | $^{i}Pr_2NEt$ : $Cy_2NMe$ = 1:1 | 37 |
| 6 | HE : $Cy_2NMe$ = 1:1 | 34 |

[a] Reaction conditions: **1a** (0.2 mmol), **2a** (2.0 equiv), reductant (3.0 equiv) and 4CzIPN (2 mol%) in DMA (1 mL) at rt. The reaction was carried out with blue LEDs in 24 h. [b] Isolated yield.

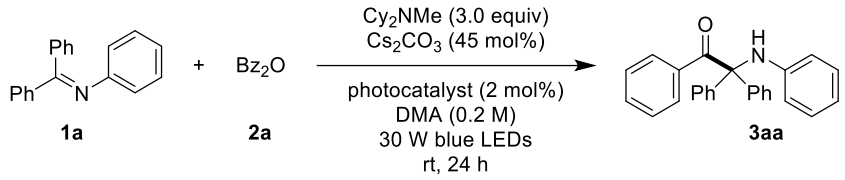
**Table S3**: Screening additives in cross-electrophile coupling reaction

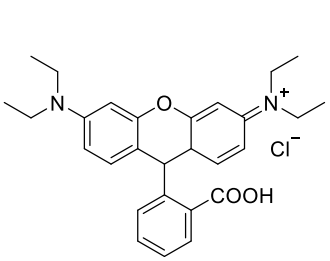



| Entry[a] | Additive | X | Yield (%)[b] |
|---|---|---|---|
| 1 | None | 0 | 53 |
| 2 | $BF_3 \cdot Et_2O$ | 20 | 30 |
| 3 | TFA | 10 | 42 |
| 4 | $Li_2CO_3$ | 20 | 60 |
| **5** | **$Cs_2CO_3$** | **45** | **67**(70)[c] |
| 6 | $Cs_2CO_3$ | 100 | 44 |
| 7 | $K_3PO_4$ | 45 | 45 |
| 8 | $K_2HPO_4$ | 45 | 56 |
| 9 | $KH_2PO_4$ | 200 | 56 |
| 10[d] | $Cs_2CO_3$ | 45 | 32% |
| 11[e] | $Cs_2CO_3$ | 45 | 50% |

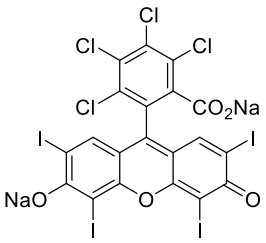
[a] Reaction conditions: **1a** (0.2 mmol), **2a** (2.0 equiv), $Cy_2NMe$ (3.0 equiv), additive (x mol%) and 4CzIPN (2 mol%) in DMA (1 mL) at rt. The reaction was carried out with blue LEDs in 24 h. [b] Isolated yield. [c] Reaction time 36 h.[d] DMA (0.5 mL). [e] DMA (2 mL).

**Table S4**: Screening photocatalysts in cross-electrophile coupling reaction

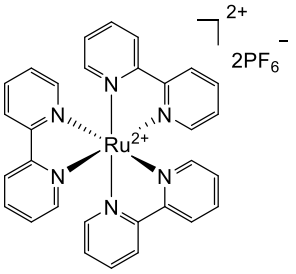



Rhodamine B




Rose bengal



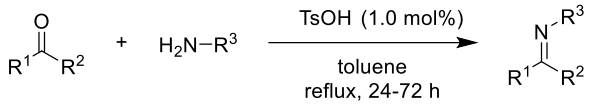

$Ru(bpy)_3(PF_6)_2$

| Entry[a] | Photocatalyst | Yield (%)[b] |
|---|---|---|
| 1 | 4CzIPN | 67 |
| 2 | Rhodamine B | 0 |
| 3 | Roes Bengal | 0 |
| **4** | **$Ru(bpy)_3(PF_6)_2$** | **91** |

[a] Reaction conditions: **1a** (0.2 mmol), **2a** (2.0 equiv), $Cy_2NMe$ (3.0 equiv), $Cs_2CO_3$ (45 mol%) and photocatalyst (2 mol%) in DMA (1 mL) at rt. The reaction was carried out with blue LEDs in 24 h. [b] Isolated yield.

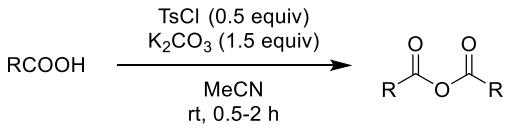
**Experimental details and characterization data**

**General Procedure GP1 - Condensation of ketones and amines**



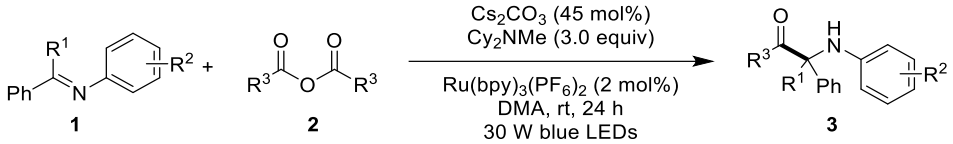

In a modified procedure [2], ketone (5.0 mmol, 1.0 equiv), amine (5.0 mmol, 1.0 equiv) were dissolved in toluene (10 mL) and then treated with TsOH (8.6 mg, 1 mol%). The resulting mixture was refluxed for 24-72 h. The reaction progress was monitored using TLC. Upon completion of the reaction, the reaction mixture was cooled down to room temperature and then was diluted with EtOAc. The solution was washed with brine (20 mL×1), dried over $Na_2SO_4$, and concentrated under vacuum. The crude residue was purified by recrystallization or flash chromatography on silica gel using ethyl acetate and petroleum ether as eluents.

**General Procedure GP2 – Synthesis of anhydrides**




In a modified procedure [3], carboxylic acid (2.0 mmol, 1.0 equiv), TsCl (141 mg, 0.5 equiv) and $K_2CO_3$ (414 mg, 1.5 equiv) were dissolved in MeCN (8 mL) and stirred at room temperature for 0.5-2 h. The reaction progress was monitored using TLC. Upon completion of the reaction, the mixture was filtered and washed with $CH_2Cl_2$, dried over $Na_2SO_4$, and concentrated under vacuum. The crude material was used for reaction without further purification.

**General Procedure GP3 – Photoredox-catalyzed cross-electrophile coupling reaction**

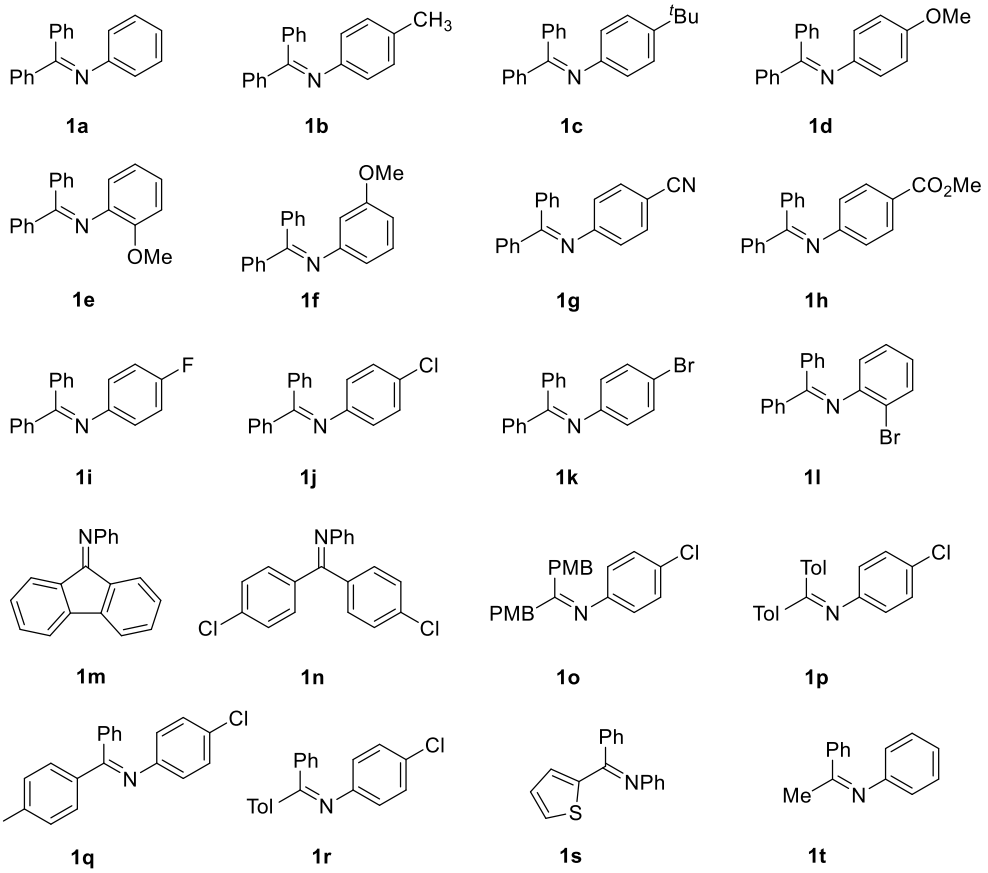



To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1** (0.2 mmol), **2** (0.4 mmol, 2.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) and $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LEDs and stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and

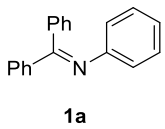
evaporated under vacuum. The residue was purified by silica gel chromatography to provide the desired product **3**.

**Reagent and Substrate Synthesis**

**All ketimines were synthesis according to the general procedure GP1.**

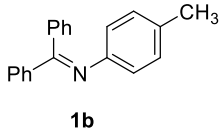



***N*,1,1-Triphenylmethanimine (1a)**




Prepared according to the general procedure **GP1**, starting from benzophenone and aniline. The crude residue was purified by recrystallization in ethyl ether. This compound has been reported already. [2]

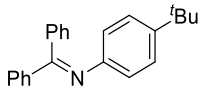
**1,1-Diphenyl-*N*-(p-tolyl)methanimine (1b)**




Prepared according to the general procedure **GP1**, starting from benzophenone and *p*-toluidine. The crude residue was purified by flash chromatography (eluted with

petroleum ether/EtOAc = 50:1). This compound has been reported already. [2]

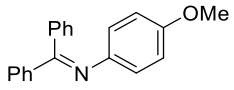
***N*-(4-(*tert*-Butyl)phenyl)-1,1-diphenylmethanimine (1c)**




**1c**

Prepared according to the general procedure **GP1**, starting from benzophenone and 4-(*tert*-butyl)aniline. The crude residue was purified by recrystallization in ethyl ether. This compound has been reported already. [4]

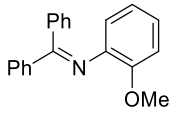
***N*-(4-Methoxyphenyl)-1,1-diphenylmethanimine (1d)**




**1d**

Prepared according to the general procedure **GP1**, starting from benzophenone and 4-methoxyaniline. The crude residue was purified by recrystallization in ethyl ether. This compound has been reported already. [2]

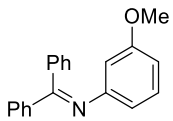
***N*-(2-Methoxyphenyl)-1,1-diphenylmethanimine (1e)**




**1e**

Prepared according to the general procedure **GP1**, starting from benzophenone and 2-methoxyaniline. The crude residue was purified by flash chromatography (eluted with petroleum ether/EtOAc = 50:1). This compound has been reported already. [5]

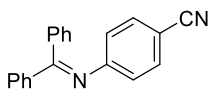
***N*-(3-Methoxyphenyl)-1,1-diphenylmethanimine (1f)**




**1f**

Prepared according to the general procedure **GP1**, starting from benzophenone and 3-methoxyaniline. The crude residue was purified by flash chromatography (eluted with petroleum ether/EtOAc = 30:1). This compound has been reported already. [4]

**4-((Diphenylmethylene)amino)benzonitrile (1g)**

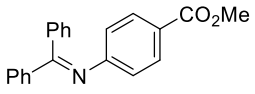



**1g**

Prepared according to the general procedure **GP1**, starting from benzophenone and 4-

aminobenzonitrile. The crude residue was purified by recrystallization in ethyl ether. This compound has been reported already. [4]

**Methyl 4-((diphenylmethylene)amino)benzoate (1h)**

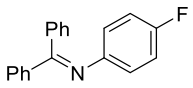



**1h**

Prepared according to the general procedure **GP1**, starting from benzophenone and methyl 4-aminobenzoate. The crude residue was purified by flash chromatography (eluted with petroleum ether/EtOAc = 50:1).

This compound has been reported already. [6]

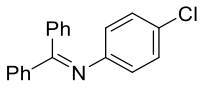
***N*-(4-Fluorophenyl)-1,1-diphenylmethanimine (1i)**




**1i**

Prepared according to the general procedure **GP1**, starting from benzophenone and 4-fluoroaniline. The crude residue was purified by recrystallization in ethyl ether. This compound has been reported already. [4]

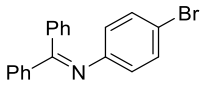
***N*-(4-Chlorophenyl)-1,1-diphenylmethanimine (1j)**




**1j**

Prepared according to the general procedure **GP1**, starting from benzophenone and 4-chloroaniline. The crude residue was purified by recrystallization in petroleum ether/EtOAc. This compound has been reported already. [2]

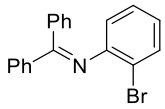
***N*-(4-Bromophenyl)-1,1-diphenylmethanimine (1k)**




**1k**

Prepared according to the general procedure **GP1**, starting from benzophenone and 4-bromoaniline. The crude residue was purified by recrystallization in ethyl ether. This compound has been reported already. [4]

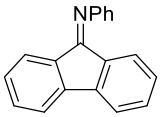
***N*-(2-Bromophenyl)-1,1-diphenylmethanimine (1l)**




**1l**

Prepared according to the general procedure **GP1**, starting from benzophenone and methyl 4-aminobenzoate. The crude residue was purified by flash chromatography (eluted with petroleum ether). This compound has been reported already. [7]

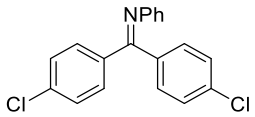
***N*-Phenyl-9H-fluoren-9-imine (1m)**




**1m**

Prepared according to the general procedure **GP1**, starting from 9H-fluoren-9-one and aniline. The crude residue was purified by recrystallization in ethyl ether. This compound has been reported already. [8]

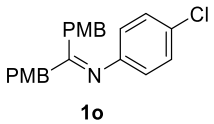
**1,1-Bis(4-chlorophenyl)-*N*-phenylmethanimine (1n)**




**1n**

Prepared according to the general procedure **GP1**, starting from bis(4-chlorophenyl)methanone and aniline. The crude residue was purified by recrystallization in EtOH/toluene. This compound has been reported already.[9]

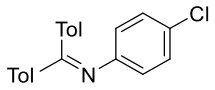
***N*-(4-Chlorophenyl)-1,1-bis(4-methoxyphenyl)methanimine (1o)**




**1o**

Prepared according to the general procedure **GP1**, starting from bis(4-methoxyphenyl)methanone and 4-chloroaniline. The crude residue was purified by flash chromatography (PE : EA = 30 : 1 as eluent) to give the desired product as a yellow solid in 83% yield. **Mp.** 108-109 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.69 (d, *J* = 8.8 Hz, 2H), 7.10 (d, *J* = 8.4 Hz, 2H), 7.03 (d, *J* = 8.8 Hz, 2H), 6.91 (d, *J* = 8.8 Hz, 2H), 6.78 (d, *J* = 8.8 Hz, 2H), 6.65 (d, *J* = 8.8 Hz, 2H), 3.85 (s, 3H), 3.79 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 168.0, 161.8, 159.7, 150.3, 132.5, 131.3, 131.2, 128.6, 128.1, 127.9, 122.6, 113.5, 113.4, 55.4, 55.2. **HRMS** (EI, m/z): calcd for $C_{21}H_{18}ClNO_2$: 351.1021, found: 351.1022 $[M]^+$.

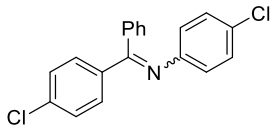
***N*-(4-Chlorophenyl)-1,1-di-*p*-tolylmethanimine (1p)**




**1p**

Prepared according to the general procedure **GP1**, starting from di-*p*-tolylmethanone and 4-chloroaniline. The crude residue was purified by recrystallization in ethyl ether to give the desired product as a yellow solid in 41% yield. **Mp.** 118-119 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.63 (d, *J* = 8.0 Hz, 2H), 7.21 (d, *J* = 8.0 Hz, 2H), 7.16-7.04 (m, 4H), 6.98 (d, *J* = 8.0 Hz, 2H), 6.70-6.60 (m, 2H), 2.41 (s, 3H), 2.33 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 169.0, 150.1, 141.2, 138.7, 137.0, 133.0, 129.5, 129.4, 128.9, 128.7, 128.5, 128.1, 122.4, 21.5, 21.4. **HRMS** (EI, m/z): calcd for $C_{21}H_{18}ClN$: 319.1122, found: 319.1126 $[M]^+$.

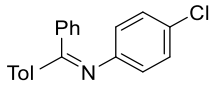
**(E)-*N*,1-Bis(4-chlorophenyl)-1-phenylmethanimine (1q)**




**1q**

Prepared according to the general procedure **GP1**, starting from (4-chlorophenyl)(phenyl)methanone and 4-chloroaniline. The crude residue was purified by flash chromatography (eluted with petroleum ether/EtOAc = 80:1) to give the desired product a as yellow solid in 29% yield. **Mp.** 90-91 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.78-7.69 (m, 2H), 7.49-7.40 (m, 2H), 7.38-7.28 (m, 3H), 7.21-7.06 (m, 4H), 6.71-6.64 (m, 2H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 167.7, 149.4, 139.0, 137.8, 137.2, 135.4, 134.9, 134.2, 131.1, 130.8, 130.6, 129.3, 129.0, 128.7, 128.6, 128.5, 128.3, 128.2, 122.3, 122.2. **HRMS** (ESI, m/z): calcd for $C_{19}H_{14}Cl_2N$: 326.0498, found: 326.0502 $[M+H]^+$. This mixture exists *E*/*Z* isomers and the ratio of *E*/*Z* isomers cannot be identified. However, it does not influence the following reaction.

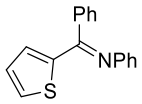
**(*E*)-*N*-(4-Chlorophenyl)-1-phenyl-1-(*p*-tolyl)methanimine (1r)**




**1r**

Prepared according to the general procedure **GP1**, starting from phenyl(*p*-tolyl)methanone and 4-chloroaniline. The crude residue was purified by flash chromatography (eluted with petroleum ether/EtOAc = 60:1). This compound has been reported already.[10]

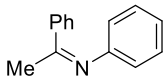
**(*Z*)-*N*,1-Diphenyl-1-(thiophen-2-yl)methanimine (1s)**



**1s**

Prepared according to the general procedure **GP1**, starting from phenyl(thiophen-2-yl)methanone and aniline. The crude residue was purified by recrystallization in EtOH/toluene. This compound has been reported already.[2]

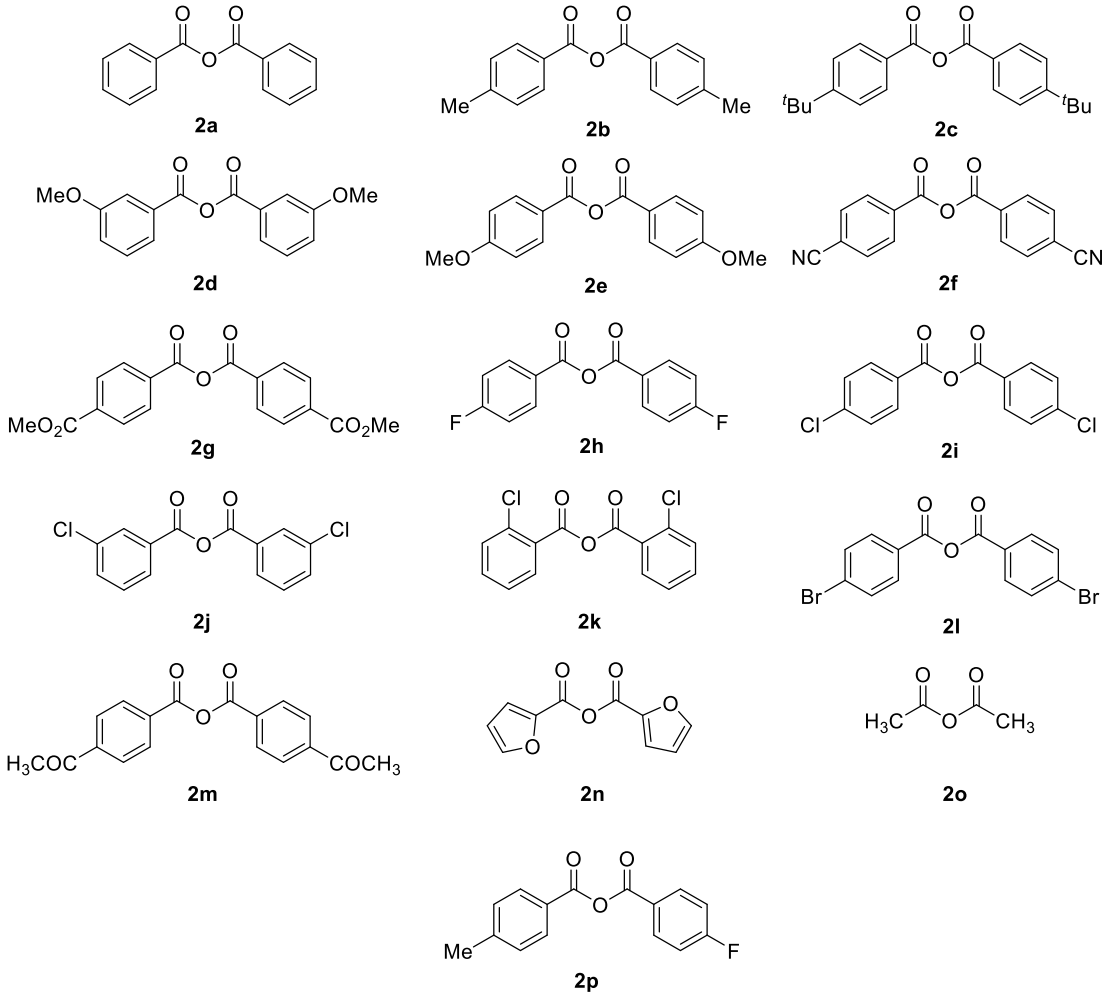
**(*Z*)-*N*,1-Diphenylethan-1-imine (1t)**



**1t**

Prepared according to the general procedure **GP1**, starting from acetophenone and aniline. The crude residue was used without further purification. This compound has been reported already.[8]

**Except for acetic anhydride and benzoic anhydride, which were purchased from commercial suppliers, 2b-2n were synthesized according to GP2.**



**2a** **2b** **2c**

**2d** **2e** **2f**

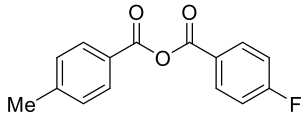
**2g** **2h** **2i**

**2j** **2k** **2l**

**2m** **2n** **2o**

**2p**

**4-Fluorobenzoic 4-methylbenzoic anhydride (2p)**



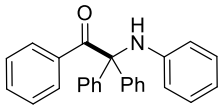

**2p**

**Step 1**: 4-methylbenzoic acid (272 mg, 2.0 mmol, 1.0 equiv) was dissolved in DCM (10 mL) and then treated with $SOCl_2$ (174 μL, 2.4 mmol, 1.2 equiv) and catalytic amount DMF. The resulting mixture was stirred at room temperature for 3 h. Upon completion of the reaction, the mixture was concentrated under vacuum. The crude material was used for reaction without further purification.

**Step 2**: 4-fluorobenzoic acid (280 mg, 2.0 mmol, 1.0 equiv) was dissolved in toluene (5 mL) and then treated with $Et_3N$ (242 mg, 2.4 mmol, 1.2 equiv) and benzoyl chloride from **Step 1**. The resulting mixture was stirred at room temperature for 12 h. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The crude material was confirmed pure by $^1H$ NMR and directly used for reaction without further purification.

**α-Amino ketones**

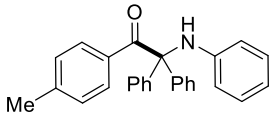
**1,2,2-Triphenyl-2-(phenylamino)ethan-1-one (3aa)**



**3aa**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 100:1) to give the desired product (66.1 mg, 91% yield) as a yellow solid. $\mathbf{R_f}$ = 0.60 (petroleum ether/EtOAc = 30:1). **Mp.** 189-190 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.49 (d, *J* = 7.2 Hz, 4H), 7.31-7.13 (m, 9H), 7.06 (t, *J* = 7.6 Hz, 2H), 6.82 (t, *J* = 7.6 Hz, 2H), 6.48 (t, *J* = 7.2 Hz, 1H), 6.28 (d, *J* = 8.0 Hz, 2H), 5.53 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 199.5, 144.7, 140.0, 137.1, 131.8, 129.6, 128.6, 128.6, 128.4, 127.9, 127.6, 117.9, 115.6, 75.2. **HRMS** (ESI, m/z): calcd for $C_{26}H_{21}NO$: 363.1618, found: 363.1595 $[M]^+$.

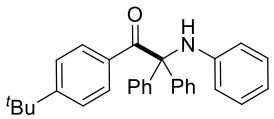
**2,2-Diphenyl-2-(phenylamino)-1-(p-tolyl)ethan-1-one (3ab)**



**3ab**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2b** (101.6 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 50:1) to give the desired product (45.1 mg, 60% yield) as a yellow solid. $\mathbf{R_f}$ = 0.50 (petroleum ether/EtOAc = 30:1). **Mp.** 160-161 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.67-7.58 (m, 4H), 7.42-7.28 (m, 8H), 7.06-6.93 (m, 4H), 6.67-6.56 (m, 1H), 6.48-6.39 (m, 2H), 5.69 (s, 1H), 2.32 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.7, 144.8, 142.7, 140.3, 134.0, 130.1, 128.7 (X 2), 128.6, 128.4, 127.6, 117.9, 115.6, 75.2, 21.6. **HRMS** (EI, m/z): calcd for $C_{27}H_{21}N$: 359.1674, found: 359.1670 $[M\text{-}H_2O]^+$.

**1-(4-(Tert-butyl)phenyl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3ac)**

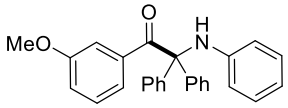


**3ac**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2c** (135.2 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv)

and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 50:1) to give the desired product (56.2 mg, 67% yield) as a yellow solid. $\mathbf{R_f}$ = 0.60 (petroleum ether/EtOAc = 10:1). **Mp.** 218-219 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.65-7.57 (m, 4H), 7.40-7.30 (m, 8H), 7.22 (d, *J* = 8.8 Hz, 2H), 7.06-6.90 (t, *J* = 8.0 Hz, 2H), 6.63-6.57 (t, *J* = 7.2 Hz, 1H), 6.46-6.37 (d, *J* = 7.6 Hz, 2H), 5.71 (s, 1H), 1.28 (s, 9H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.6, 155.4, 144.7, 139.9, 129.8, 128.7, 128.4, 128.3, 127.5, 124.9, 117.7, 115.6, 75.2, 34.9, 31.0. **HRMS** (EI, m/z): calcd for $C_{30}H_{27}N$: 401.2143, found: 401.2151 $[M\text{-}H_2O]^+$.

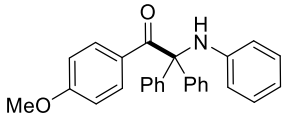
**1-(3-Methoxyphenyl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3ad)**




**3ad**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2d** (114.0 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/$CH_2Cl_2$ = 5:1) to give the desired product (50.1 mg, 63% yield) as a yellow solid. $\mathbf{R_f}$ = 0.60 (petroleum ether/$CH_2Cl_2$ = 2:1). **Mp.** 152-153 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.63-7.57 (m, 4H), 7.56-7.51 (m, 2H), 7.39-7.24 (m, 6H), 6.97 (m, 2H), 6.73-6.67 (m, 2H), 6.61 (t, *J* = 7.2 Hz, 1H), 6.47-6.39 (d, *J* = 7.6 Hz, 2H), 5.65 (s, 1H), 3.79 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 197.4, 162.5, 144.9, 140.6, 132.5, 128.9, 128.6 (X 2), 128.4, 127.5, 117.8, 115.6, 113.2, 75.1, 55.4. **HRMS** (EI, m/z): calcd for $C_{27}H_{21}NO$: 375.1623, found: 375.1629 $[M\text{-}H_2O]^+$.

**1-(4-Methoxyphenyl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3ae)**

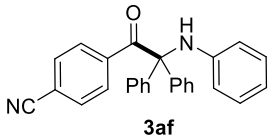



**3ae**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2e** (114.0 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 10:1) to give the desired product (33.4 mg, 42% yield) as a yellow solid. $\mathbf{R_f}$ = 0.20 (petroleum ether/EtOAc = 10:1). **Mp.** 150-151 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.53-7.45 (m, 4H), 7.44-7.37 (m, 2H), 7.29-7.12 (m, 6H), 6.84 (m, 2H), 6.62-6.54 (m, 2H), 6.48 (t, *J*

= 7.2 Hz, 1H), 6.35-6.25 (m, 2H), 5.52 (s, 1H), 3.66 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 197.3, 162.5, 144.8, 140.5, 132.4, 128.8, 128.6, 128.5, 128.4, 127.5, 117.8, 115.5, 113.2, 75.0, 55.3. **HRMS** (ESI, m/z): calcd for $C_{27}H_{24}NO_2$: 394.1802, found: 394.1810 $[M+H]^+$.

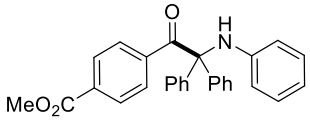
**4-(2,2-Diphenyl-2-(phenylamino)acetyl)benzonitrile (3af)**




**3af**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2f** (110.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 20:1) to give the desired product (41.3 mg, 53% yield) as a yellow solid. **$R_f$** = 0.40 (petroleum ether/EtOAc = 10:1). **Mp.** 128-129 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.55 (m, 4H), 7.44-7.26 (m, 10H), 6.91 (dd, *J* = 8.0, 7.2 Hz, 2H), 6.58 (t, *J* = 7.2 Hz, 1H), 6.32 (d, *J* = 8.0 Hz, 2H), 5.39 (s, 1H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 199.0, 144.4, 141.3, 139.8, 131.6, 129.6, 128.8, 128.7, 128.1, 128.0, 118.5, 118.0, 115.5, 114.8, 75.1. **HRMS** (EI, m/z): calcd for $C_{27}H_{20}N_2O$: 388.1570, found: 388.1582 $[M]^+$.

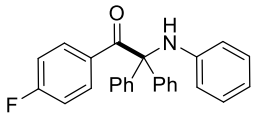
**Methyl 4-(2,2-diphenyl-2-(phenylamino)acetyl)benzoate (3ag)**




**3ag**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2g** (136.8 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 20:1) to give the desired product (57.9 mg, 69% yield) as a yellow solid. **$R_f$** = 0.40 (petroleum ether/EtOAc = 10:1). **Mp.** 139-140 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.4 Hz, 2H), 7.63-7.55 (m, 4H), 7.38-7.30 (m, 8H), 6.94 (m, 2H), 6.64-6.57 (m, 1H), 6.42-6.35 (m, 2H), 5.57 (s, 1H), 3.91 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 199.5, 166.2, 144.5, 141.3, 139.7, 132.4, 129.3, 129.0, 128.7, 128.6, 128.4, 127.8, 118.2, 115.6, 75.2, 52.4. **HRMS** (ESI, m/z): calcd for $C_{28}H_{23}NO_3Na$: 444.1570, found: 444.1575 $[M+Na]^+$.

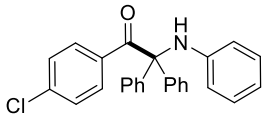
**1-(4-Fluorophenyl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3ah)**




**3ah**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2h** (104.8 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 50:1) to give the desired product (66.0 mg, 86% yield) as a yellow solid. $\mathbf{R_f}$ = 0.50 (petroleum ether/EtOAc = 30:1). **Mp.** 145-146 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.64-7.55 (m, 4H), 7.49 (m, 2H), 7.44-7.27 (m, 7H), 7.01-6.93 (m, 2H), 6.88 (t, $J$ = 8.4 Hz, 2H), 6.62 (t, $J$ = 7.2 Hz, 1H), 6.48-6.34 (d, $J$ = 8.0 Hz, 2H), 5.54 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.0, 165.7 (d, $J_{C\text{-}F}$ = 254.2 Hz), 144.7, 140.3, 133.1(d, $J_{C\text{-}F}$ = 3.3 Hz), 132.4 (d, $J_{C\text{-}F}$ = 8.9 Hz), 128.7, 128.6, 128.4, 127.7, 118.2, 115.6, 115.1 (d, $J_{C\text{-}F}$ = 22 Hz), 75.1. **$^{19}$F NMR** (377 MHz, $CDCl_3$) δ -106.40 (m). **HRMS** (EI, m/z): calcd for $C_{26}H_{18}FN$: 363.1423, found: 363.1425 $[M\text{-}H_2O]^+$.

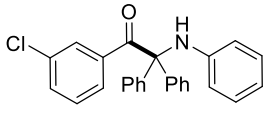
**1-(4-Chlorophenyl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3ai)**




**3ai**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2i** (117.6 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 30:1) to give the desired product (53.1 mg, 67% yield) as a yellow solid. $\mathbf{R_f}$ = 0.40 (petroleum ether/EtOAc = 10:1). **Mp.** 145-146 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.54 (d, $J$ = 7.6 Hz, 4H), 7.35-7.24 (m, 9H), 7.17-7.06 (m, 2H), 6.92 (t, $J$ = 7.6 Hz, 2H), 6.57 (t, $J$ = 7.2 Hz, 1H), 6.35 (d, $J$ = 8.0 Hz, 2H), 5.49 (s, 1H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 198.3, 144.6, 140.1, 138.2, 135.2, 131.1, 128.6, 128.5, 128.3, 128.2, 127.7, 118.2, 115.5, 75.1. **HRMS** (EI, m/z): calcd for $C_{26}H_{18}NCl$: 379.1133, found: 379.1149 $[M\text{-}H_2O]^+$.

**1-(3-Chlorophenyl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3aj)**

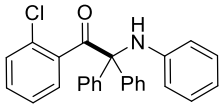



**3aj**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2j** (117.6 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv)

and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 30:1) to give the desired product (57.2 mg, 72% yield) as a yellow solid. $\mathbf{R_f}$ = 0.40 (petroleum ether/EtOAc = 10:1). **Mp.** 179-180 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.62-7.51 (m, 4H), 7.37-7.21 (m, 8H), 7.18 (d, *J* = 8.0 Hz, 1H), 7.05 (t, *J* = 8.0 Hz, 1H), 6.91 (t, *J* = 8.0 Hz, 2H), 6.57 (t, *J* = 7.2 Hz, 1H), 6.36 (d, *J* = 8.0 Hz, 2H), 5.51 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.3, 144.5, 139.8, 138.7, 134.0, 131.7, 129.7, 129.1, 128.7, 128.6, 128.4, 127.8, 127.6, 118.2, 115.6, 75.2. **HRMS** (EI, m/z): calcd for $C_{26}H_{18}NCl$: 379.1133, found: 379.1128 $[M-H_2O]^+$.

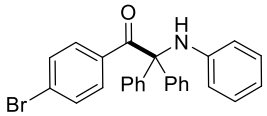
**1-(2-Chlorophenyl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3ak)**




**3ak**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2k** (117.6 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 30:1) to give the desired product (56.2 mg, 71% yield) as a white solid. $\mathbf{R_f}$ = 0.40 (petroleum ether/EtOAc = 10:1). **Mp.** 139-140 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.51 (m, 4H), 7.30-7.11 (m, 8H), 6.97-6.87 (m, 3H), 6.54 (t, *J* = 7.2 Hz, 1H), 6.41 (d, *J* = 8.0 Hz, 3H), 6.28 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 199.1, 144.0, 137.7, 135.7, 132.9, 130.7, 130.0, 129.6, 128.4, 128.2, 128.1, 127.8, 125.7, 117.6, 116.0, 76.3. **HRMS** (EI, m/z): calcd for $C_{26}H_{20}ClNO$: 397.1228, found: 397.1236 $[M]^+$.

**1-(4-Bromophenyl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3al)**

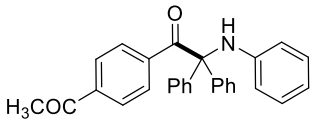



**3al**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2l** (152.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 20:1) to give the desired product (65.0 mg, 74% yield) as a yellow solid. $\mathbf{R_f}$ = 0.35 (petroleum ether/EtOAc = 10:1). **Mp.** 150-151 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.45 (m, 4H), 7.33-7.12 (m, 10H), 6.90-6.78 (m, 2H), 6.49 (d, *J* = 7.2, 1H), 6.27 (dd, *J* = 7.6, 2.4 Hz, 2H), 5.43 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.5, 144.6, 140.0, 135.7, 131.2 (X

2), 128.7, 128.6, 128.4, 127.8, 126.9, 118.2, 115.5, 75.1. **HRMS** (ESI, m/z): calcd for $C_{26}H_{20}BrNNaO$: 466.0600, found: 466.0638 $[M+Na]^+$.

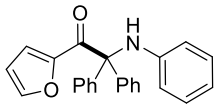
**1-(4-Acetylphenyl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3am)**




**3am**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2m** (124.0 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 20:1) to give the desired product (13.1 mg, 16% yield) as a yellow solid. $\mathbf{R_f}$ = 0.30 (petroleum ether/EtOAc = 10:1). **Mp.** 170-171 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.73-7.68 (m, 2H), 7.58-7.54 (m, 4H), 7.38-7.26 (m, 8H), 6.95-6.87 (m, 2H), 6.57 (t, *J* = 7.2 Hz, 1H), 6.39-6.32 (m, 2H), 5.54 (s, 1H), 2.52 (s, 3H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 199.3, 197.4, 144.5, 141.2, 139.7, 138.7, 129.6, 128.7, 128.6, 128.4, 127.7, 118.2, 115.5, 75.1, 26.7. **HRMS** (ESI, m/z): calcd for $C_{28}H_{24}NO_2$: 406.1802, found: 406.1758 $[M+H]^+$

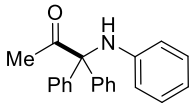
**1-(Furan-2-yl)-2,2-diphenyl-2-(phenylamino)ethan-1-one (3an)**




**3an**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2n** (82.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/ $CH_2Cl_2$ = 2:1) to give the desired product (40.2 mg, 56% yield) as a yellow solid. $\mathbf{R_f}$ = 0.60 (petroleum ether/$CH_2Cl_2$ = 1:1). **Mp.** 197-198 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.60-7.52 (m, 4H), 7.34-7.21 (m, 7H), 6.95 (m, 2H), 6.82 (dd, *J* = 3.6, 0.8 Hz, 1H), 6.60 (m, 1H), 6.50-6.41 (m, 2H), 6.29 (dd, *J* = 3.6, 2.0 Hz, 1H), 5.67 (brs, 1H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 186.8, 151.0, 146.0, 144.8, 140.4, 128.6, 128.3, 128.2, 127.4, 120.5, 118.1, 115.6, 111.9, 73.8. **HRMS** (ESI, m/z): calcd for $C_{24}H_{20}NO_2$: 354.1489, found: 354.1504 $[M+H]^+$.

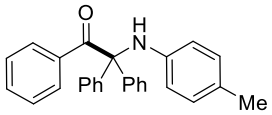
**1,1-Diphenyl-1-(phenylamino)propan-2-one (3ao)**




**3ao**

According to **GP3** from **1a** (51.4 mg, 0.2 mmol), **2o** (37.5 μL, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 100:1) to give the desired product (20.0 mg, 33% yield) as a white solid. $\mathbf{R_f}$ = 0.50 (petroleum ether/EtOAc = 30:1). **Mp.** 165-166 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.61-7.53 (m, 4H), 7.40-7.31 (m, 4H), 7.31-7.22 (m, 2H), 7.01-6.90 (m, 2H), 6.62-6.54 (m, 1H), 6.45-6.36 (m, 2H), 5.78 (s, 1H), 2.14 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 204.8, 144.4, 138.4, 128.8, 128.7, 128.5, 127.8, 117.7, 115.4, 75.3, 26.1. **HRMS** (ESI, m/z): calcd for $C_{21}H_{20}NO$: 302.1539, found: 302.1542 $[M+H]^+$.

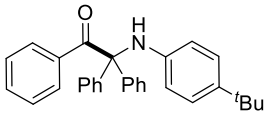
**1,2,2-Triphenyl-2-(*p*-tolylamino)ethan-1-one (3ba)**




**3ba**

According to **GP3** from **1b** (54.2 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 100:1) to give the desired product (60.8 mg, 81% yield) as a yellow solid. $\mathbf{R_f}$ = 0.60 (petroleum ether/EtOAc = 30:1). **Mp.** 168-169 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.56 (m, 4H), 7.39-7.19 (m, 9H), 7.14 (t, $J$ = 7.6 Hz, 2H), 6.71 (d, $J$ = 8.0 Hz, 2H), 6.32-6.21 (m, 2H), 5.46 (brs, 1H), 2.09 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 199.6, 142.3, 140.3, 137.1, 131.7, 129.6, 129.1, 128.6, 128.4, 127.9, 127.6, 127.0, 115.6, 75.2, 20.4. **HRMS** (ESI, m/z): calcd for $C_{27}H_{23}NNaO$: 400.1672, found: 400.1638 $[M+Na]^+$.

**2-((4-(*tert*-Butyl)phenyl)amino)-1,2,2-triphenylethan-1-one (3ca)**

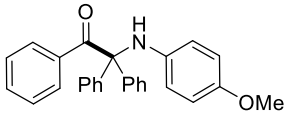



**3ca**

According to **GP3** from **1c** (62.6 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 100:1) to give the desired product (57.1 mg, 68% yield) as a yellow solid. $\mathbf{R_f}$ = 0.60 (petroleum ether/EtOAc = 30:1). **Mp.** 198-199 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.62-7.54 (m, 4H), 7.35-7.27 (m, 7H), 7.25 (m, 2H), 7.13 (t, $J$ = 7.6 Hz, 2H), 6.94-6.87 (m, 2H), 6.35

-6.23 (m, 2H), 5.42 (brs, 1H), 1.16 (s, 9H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 199.7, 142.2, 140.6, 140.4, 137.2, 131.6, 129.5, 128.5, 128.4, 127.8, 127.5, 125.3, 115.3, 75.3, 33.7, 31.4. **HRMS** (ESI, m/z): calcd for $C_{30}H_{27}N$: 401.2149, found: 401.2151 $[M-H_2O]^+$.

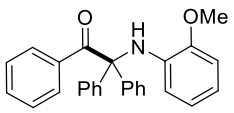
**2-((4-Methoxyphenyl)amino)-1,2,2-triphenylethan-1-one (3da)**




**3da**

According to **GP3** from **1d** (57.4 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 30:1) to give the desired product (50.9 mg, 65% yield) as a white oil. **$R_f$** = 0.30 (petroleum ether/EtOAc = 10:1). **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.39-7.34 (m, 3H), 7.30-7.25 (m, 10H), 7.19-7.12 (m, 3H), 6.62-6.57 (m, 2H), 6.47-6.42 (m, 2H), 3.62 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 171.1, 158.1, 139.1, 136.8, 134.0, 131.1, 129.6, 129.2, 128.6, 128.1, 127.7, 127.4, 113.4, 64.6, 55.2. **HRMS** (ESI, m/z): calcd for $C_{27}H_{24}NO_2$: 394.1802, found: 394.1810 $[M+H]^+$.

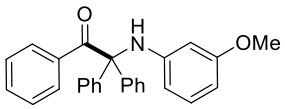
**2-((2-Methoxyphenyl)amino)-1,2,2-triphenylethan-1-one (3ea)**




**3ea**

According to **GP3** from **1e** (57.4 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 100:1) to give the desired product (62.3 mg, 79% yield) as a yellow solid. **$R_f$** = 0.60 (petroleum ether/EtOAc = 30:1). **Mp.** 167-168 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.63-7.59 (m, 4H), 7.45-7.40 (m, 2H), 7.36-7.29 (m, 5H), 7.27 (m, 1H), 7.24 (m, 1H), 7.15-7.10 (m, 2H), 6.59 (t, *J* = 8.0,1H), 6.51 (m, 2H), 6.17 (dd, *J* = 7.6, 2.0 Hz, 1H), 6.09 (s, 1H), 3.72 (s, 3H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 199.9, 147.2, 141.4, 136.8, 134.8, 131.5, 129.3, 128.4, 128.0, 127.5, 127.3, 120.4, 117.5, 114.2, 109.3, 74.9, 55.6. **HRMS** (EI, m/z): calcd for $C_{27}H_{23}NO_2$: 393.1723, found: 393.1725 $[M]^+$.

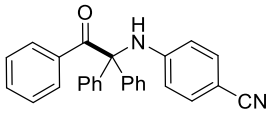
**2-((3-Methoxyphenyl)amino)-1,2,2-triphenylethan-1-one (3fa)**




**3fa**

According to **GP3** from **1f** (57.4 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 30:1) to give the desired product (55.2 mg, 70% yield) as a yellow solid. $\mathbf{R_f}$ = 0.40 (petroleum ether/EtOAc = 10:1). **Mp.** 152-153 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.56 (m, 4H), 7.35-7.22 (m, 9H), 7.20-7.11 (m, 2H), 6.82 (t, *J* = 8.0 Hz, 1H), 6.13 (dd, *J* = 8.0, 2.0 Hz, 1H), 6.00 (dd, *J* = 8.0, 2.0 Hz, 1H), 5.90 (t, *J* = 2.4 Hz, 1H), 5.69 (brs, 1H), 3.53 (s, 3H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 199.3, 160.0, 146.0, 139.7, 137.0, 131.8, 129.7, 129.3, 128.7, 128.4, 127.9, 127.7, 108.6, 103.6, 101.5, 75.2, 54.9. **HRMS** (EI, m/z): calcd for $C_{27}H_{23}NO_2$: 393.1723, found: 393.1724 $[M]^+$.

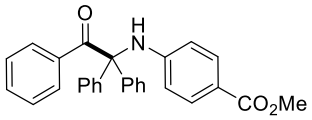
**4-((2-Oxo-1,1,2-triphenylethyl)amino)benzonitrile (3ga)**




**3ga**

According to **GP3** from **1g** (56.4 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 6:1) to give the desired product (51.4 mg, 66% yield) as a yellow solid. $\mathbf{R_f}$ = 0.30 (petroleum ether/EtOAc = 5:1). **Mp.** 230-231 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.59-7.49 (m, 4H), 7.45-7.31 (m, 7H), 7.28-7.18 (m, 6H), 6.62 (s, 1H), 6.44 (d, *J* = 8.4 Hz, 2H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.2, 148.1, 137.5, 136.4, 133.1, 132.3, 129.9, 129.0, 128.8, 128.4, 128.2, 120.3, 115.3, 99.7, 75.1. **HRMS** (EI, m/z): calcd for $C_{27}H_{20}N_2O$: 388.1570, found: 388.1581 $[M]^+$.

**Methyl 4-((2-oxo-1,1,2-triphenylethyl)amino)benzoate (3ha)**

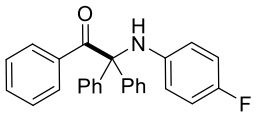



**3ha**

According to **GP3** from **1h** (63.0 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was

purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 10:1) to give the desired product (62.4 mg, 74% yield) as a yellow solid. $\mathbf{R_f}$ = 0.30 (petroleum ether/EtOAc = 10:1). **Mp.** 138-139 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.73-7.62 (m, 2H), 7.57 (m, 4H), 7.43-7.30 (m, 9H), 7.20 (t, $J$ = 8.0 Hz, 2H), 6.43 (m, 3H), 3.81 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.6, 167.2, 148.7, 138.4, 136.6, 132.1, 130.8, 129.8, 128.9, 128.6, 128.1, 128.0, 119.1, 114.5, 75.1, 51.5. **HRMS** (EI, m/z): calcd for $C_{28}H_{23}NO_3$: 421.1672, found: 421.1657 $[M]^+$.

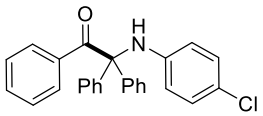
**2-((4-Fluorophenyl)amino)-1,2,2-triphenylethan-1-one (3ia)**




**3ia**

According to **GP3** from **1i** (55.0 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 50:1) to give the desired product (55.2 mg, 72% yield) as a yellow solid. $\mathbf{R_f}$ = 0.50 (petroleum ether/EtOAc = 30:1). **Mp.** 154-155 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.48 (m, 4H), 7.28-7.15 (m, 9H), 7.07 (m, 2H), 6.53 (s, 2H), 6.26-6.13 (m, 2H), 5.42 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 199.4, 156.0 (d, $J_{C\text{-}F}$ = 237.0 Hz) 141.0 (d, $J_{C\text{-}F}$ = 2.1 Hz), 139.8, 137.0, 134.6, 131.8, 130.6, 129.6, 128.9, 128.6, 128.5, 127.9, 127.7, 116.6 (d, $J_{C\text{-}F}$ = 7.4 Hz), 115.0 (d, $J_{C\text{-}F}$ = 22.3 Hz), 75.5. **$^{19}$F NMR** (565 MHz, $CDCl_3$) δ -127.08 (m). **HRMS** (EI, m/z): calcd for $C_{26}H_{20}FNO$: 381.1523, found: 381.1525 $[M]^+$.

**2-((4-Chlorophenyl)amino)-1,2,2-triphenylethan-1-one (3ja)**

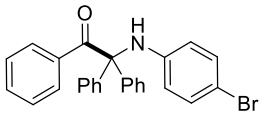



**3ja**

According to **GP3** from **1j** (58.2 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 20:1) to give the desired product (64.3 mg, 81% yield) as a yellow solid. $\mathbf{R_f}$ = 0.30 (petroleum ether/EtOAc = 10:1). **Mp.** 118-119 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.53 (d, $J$ = 7.6 Hz, 4H), 7.36-7.25 (m, 9H), 7.15 (t, $J$ = 7.6 Hz, 2H), 6.85 (d, $J$ = 8.4 Hz, 2H), 6.29 (d, $J$ = 8.4 Hz, 2H), 5.76 (s, 1H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 199.0, 143.2, 139.1, 136.8, 131.9, 130.6, 129.6, 128.9, 128.6, 128.5, 128.4, 127.9, 127.8, 122.6, 116.6, 75.2.

**HRMS** (ESI, m/z): calcd for $C_{26}H_{20}ClNONa$: 420.1126, found: 420.1144 $[M+Na]^+$.

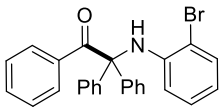
**2-((4-Bromophenyl)amino)-1,2,2-triphenylethan-1-one (3ka)**




**3ka**

According to **GP3** from **1k** (67.0 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 20:1) to give the desired product (67.0 mg, 76% yield) as a yellow solid. $\mathbf{R_f}$ = 0.30 (petroleum ether/EtOAc = 10:1). **Mp.** 151-152 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.55-7.50 (m, 4H), 7.38-7.25 (m, 9H), 7.16 (t, *J* = 8.0 Hz, 2H), 7.02-6.95 (m, 2H), 6.25 (m, 2H), 5.80 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 199.0, 143.6, 139.0, 136.8, 131.9, 131.3, 129.7, 128.7, 128.5, 128.0, 127.9, 117.1, 109.8, 75.1. **HRMS** (EI, m/z): calcd for $C_{26}H_{20}BrNO$: 441.0723, found: 441.0723 $[M]^+$.

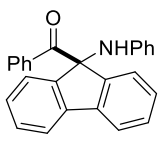
**2-((2-bromophenyl)amino)-1,2,2-triphenylethan-1-one (3la)**




**3la**

According to **GP3** from **1l** (67.0 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 100:1) to give the desired product (73.1 mg, 82% yield) as a yellow solid. $\mathbf{R_f}$ = 0.60 (petroleum ether/EtOAc = 30:1). **Mp.** 156-157 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.56 (d, *J* = 8.0 Hz, 4H), 7.41 (d, *J* = 8.4 Hz, 2H), 7.37-7.22 (m, 8H), 7.16 (t, *J* = 7.6 Hz, 2H), 6.77 (t, *J* = 7.6 Hz, 1H), 6.47-6.36 (m, 2H), 6.20 (d, *J* = 8.4 Hz, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 199.1, 141.7, 140.0, 136.4, 132.1, 131.9, 129.5, 128.5, 128.1, 127.9, 127.7, 127.4, 118.6, 115.3, 111.0, 75.1. **HRMS** (EI, m/z): calcd for $C_{26}H_{18}BrN$: 425.0596, found: 425.0652 $[M-H_2O]^+$.

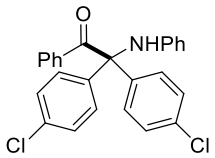
**Phenyl(9-(phenylamino)-9H-fluoren-9-yl)methanone (3ma)**




**3ma**

According to **GP3** from **1m** (51.0 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 100:1) to give the desired product (12.2 mg, 17% yield) as a white solid. $\mathbf{R_f}$ = 0.50 (petroleum ether/EtOAc = 30:1). **Mp.** 178-179 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.86 (d, *J* = 7.6 Hz, 2H), 7.51 (m, *J* = 8.4 Hz, 4H), 7.37 (d, *J* = 7.6 Hz, 3H), 7.28 (t, *J* = 7.6 Hz, 1H), 7.06 (t, *J* = 7.6 Hz, 2H), 6.96 (t, *J* = 7.6 Hz, 2H), 6.85 (d, *J* = 7.6 Hz, 2H), 6.61 (t, *J* = 7.2 Hz, 2H), 6.24 (d, *J* = 8.0 Hz, 2H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 199.2, 144.4, 143.8, 142.1, 136.1, 131.1, 129.6, 128.8, 128.6, 127.7, 127.6, 124.9, 120.8, 117.6, 114.7. **HRMS** (EI, m/z): calcd for $C_{26}H_{19}NO$: 361.1461, found: 361.1471 $[M]^+$.

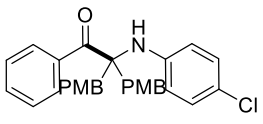
**2,2-Bis(4-chlorophenyl)-1-phenyl-2-(phenylamino)ethan-1-one (3na)**




**3na**

According to **GP3** from **1n** (65.0 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 80:1) to give the desired product (82.0 mg, 95% yield) as a yellow solid. $\mathbf{R_f}$ = 0.50 (petroleum ether/EtOAc = 30:1). **Mp.** 135-136 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.50-7.44 (m, 4H), 7.40-7.33 (m, 3H), 7.32-7.27 (m, 4H), 7.20 (t, *J* = 7.6, 2H), 6.98-6.90 (m, 2H), 6.61 (t, *J* = 7.2 Hz, 1H), 6.33 (d, *J* = 7.6 Hz, 2H), 5.50 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.8, 144.1, 138.4, 136.4, 133.8, 132.2, 129.9, 129.5, 128.8, 128.8, 128.2, 118.6, 115.7, 74.5. **HRMS** (EI, m/z): calcd for $C_{26}H_{17}Cl_2N$: 413.0738, found: 413.0744 $[M\text{-}H_2O]^+$.

**2-((4-Chlorophenyl)amino)-2,2-bis(4-methoxyphenyl)-1-phenylethan-1-one (3oa)**

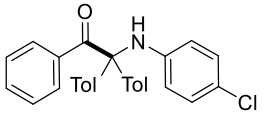



**3oa**

According to **GP3** from **1o** (75.8 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 20:1)

to give the desired product (50.2 mg, 55% yield) as a yellow solid. **$R_f$** = 0.35 (petroleum ether/EtOAc = 10:1). **Mp.** 154-155 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.44-7.38 (m, 4H), 7.34 (m, 1H), 7.26-7.23 (m, 2H), 7.16 (m, 2H), 6.88-6.80 (m, 6H), 6.33-6.26 (m, 2H), 5.91 (s, 1H), 3.77 (s, 6H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 199.3, 158.9, 143.2, 137.0, 131.7, 130.6, 130.1, 129.6, 128.4, 127.9, 125.5, 122.2, 116.6, 113.8, 74.2, 55.2. **HRMS** (EI, m/z): calcd for $C_{28}H_{22}ClNO_2$: 439.1345, found: 439.1340 $[M-H_2O]^+$.

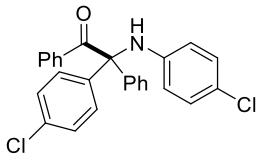
**2-((4-Chlorophenyl)amino)-1-phenyl-2,2-di-*p*-tolylethan-1-one (3pa)**




**3pa**

According to **GP3** from **1p** (63.8 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 100:1) to give the desired product (71.9 mg, 85% yield) as a yellow solid. **$R_f$** = 0.60 (petroleum ether/EtOAc = 30:1). **Mp.** 129-130 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.44-7.39 (m, 4H), 7.37-7.30 (m, 3H), 7.17 (t, *J* = 8.0 Hz, 2H), 7.11 (d, *J* = 8.4 Hz, 4H), 6.91-6.82 (m, 2H), 6.35-6.27 (m, 2H), 5.82 (s, 1H), 2.32 (s, 6H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 199.3, 143.4, 137.5, 137.0, 136.1, 131.8, 129.7, 129.2, 128.6, 128.6, 128.4, 127.9, 122.3, 116.6, 74.8, 21.1. **HRMS** (EI, m/z): calcd for $C_{28}H_{24}ClNO$: 425.1541, found: 425.1548 $[M]^+$.

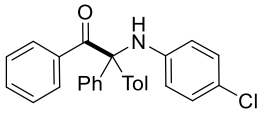
**2-(4-Chlorophenyl)-2-((4-chlorophenyl)amino)-1,2-diphenylethan-1-one (3qa)**




**3qa**

According to **GP3** from **1q** (65.0 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 40:1) to give the desired product (65.1 mg, 75% yield) as a yellow oil. **$R_f$** = 0.50 (petroleum ether/EtOAc = 10:1). **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.61 (m, 4H), 7.44 (m, 9H), 7.31 (t, *J* = 7.6 Hz, 2H), 6.99 (d, *J* = 8.0 Hz, 2H), 6.40 (d, *J* = 8.0 Hz, 2H), 5.79 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.9, 143.1, 139.7, 137.6, 136.7, 133.8, 132.3, 130.5, 129.7, 129.0, 128.7 (X 2), 128.3 (X 2), 128.2, 123.2, 116.8, 75.0. **HRMS** (EI, m/z): calcd for $C_{26}H_{19}Cl_2NO$: 431.0838, found: 431.0832 $[M]^+$.

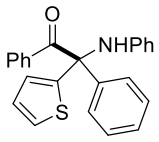
**2-((4-Chlorophenyl)amino)-1,2-diphenyl-2-(*p*-tolyl)ethan-1-one (3ra)**




**3ra**

According to **GP3** from **1r** (61.0 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 50:1) to give the desired product (65.3 mg, 79% yield) as a yellow oil. $\mathbf{R_f}$ = 0.50 (petroleum ether/EtOAc = 30:1). **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.57-7.51 (m, 2H), 7.42 (d, *J* = 8.0 Hz, 2H), 7.32 (m, 6H), 7.15 (m, 4H), 6.86 (d, *J* = 8.8 Hz, 2H), 6.30 (d, *J* = 8.8 Hz, 2H), 5.79 (s, 1H), 2.32 (s, 3H). **$^{13}$C NMR** (151 MHz, $CDCl_3$) δ 199.2, 143.3, 139.2, 137.6, 136.9, 136.1, 131.9, 129.7, 129.3, 128.7, 128.6, 128.5, 128.4, 127.9, 127.7, 122.5, 116.6, 75.0, 21.1. **HRMS** (EI, m/z): calcd for $C_{27}H_{22}ClNO$: 411.1384, found: 411.1370 $[M]^+$.

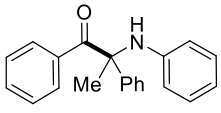
**1,2-Diphenyl-2-(phenylamino)-2-(thiophen-2-yl)ethan-1-one (3sa)**




**3sa**

According to **GP3** from **1s** (52.6 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 80:1) to give the desired product (63.2 mg, 85% yield) as a yellow solid. $\mathbf{R_f}$ = 0.50 (petroleum ether/EtOAc = 30:1). **Mp.** 140-141 °C. **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.70-7.61 (m, 2H), 7.35 (t, *J* = 7.6 Hz, 3H), 7.33-7.27 (m, 3H), 7.24 (dd, *J* = 5.2, 1.2 Hz, 1H), 7.17 (t, *J* = 8.0 Hz, 2H), 7.09 (dd, *J* = 3.6, 1.2 Hz, 1H), 6.98-6.89 (m, 3H), 6.60 (t, *J* = 7.6 Hz, 1H), 6.48 (d, *J* = 8.0 Hz, 2H), 6.09 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 198.1, 144.3, 144.2, 139.6, 136.4, 131.9, 129.6, 128.9, 128.5, 128.3, 128.1, 127.9, 127.7, 126.9, 126.4, 118.3, 116.1, 72.9. **HRMS** (EI, m/z): calcd for $C_{24}H_{19}NOS$: 369.1182, found: 369.1183 $[M]^+$.

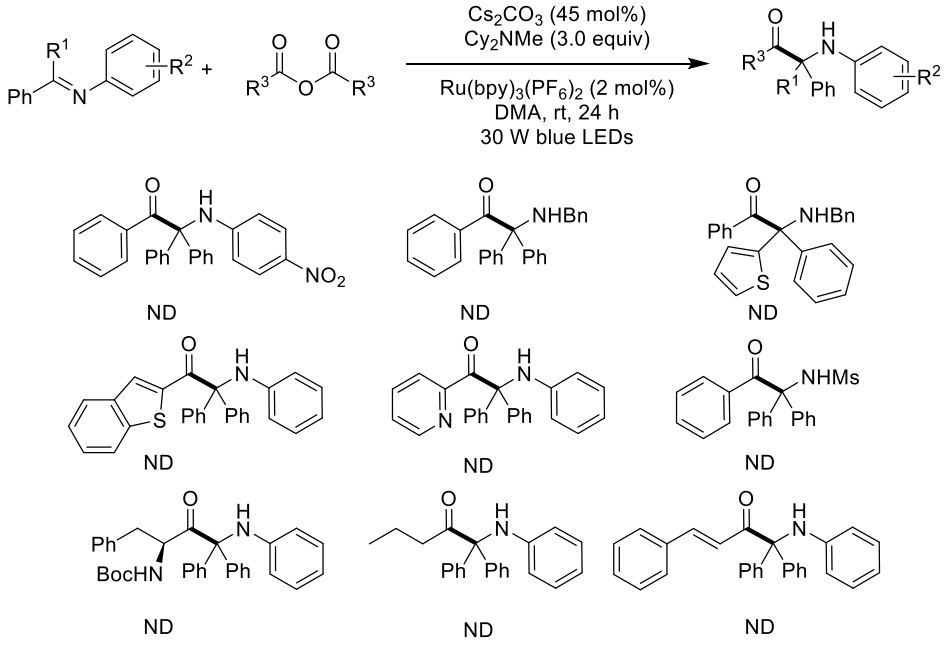
**1,2-Diphenyl-2-(phenylamino)propan-1-one (3ta)**

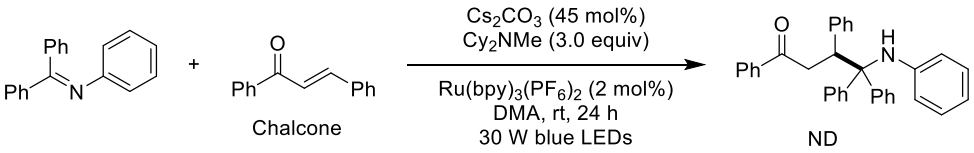



**3ta**

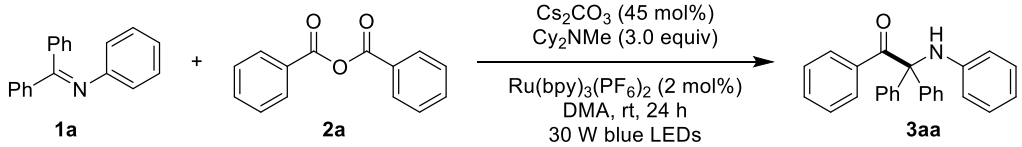
According to **GP3** from **1t** (39.0 mg, 0.2 mmol), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 4.0 μmol, 2 mol%), $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) in DMA (1 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 50:1) to give the desired product (20.2 mg, 33% yield) as a yellow oil. $\mathbf{R_f}$ = 0.35 (petroleum ether/EtOAc = 10:1). **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 8.0 Hz, 2H), 7.62 (d, *J* = 8.0 Hz, 2H), 7.37 (t, *J* = 7.6 Hz, 1H), 7.25 (m, 3H), 7.17 (t, *J* = 7.6 Hz, 1H), 7.05-6.96 (m, 3H), 6.59 (m, 3H), 6.39 (s, 1H), 1.99 (s, 3H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 197.3, 144.7, 144.0, 142.5, 140.4, 135.5, 132.2, 129.8, 128.9, 128.7, 128.4, 128.1, 127.7, 127.5, 127.4, 126.2, 126.2, 117.2, 114.9, 69.5, 17.3. **HRMS** (EI, m/z): calcd for $C_{21}H_{17}N$: 283.1355, found: 283.1361 $[M-H_2O]^+$.

**Unsuccessful results**



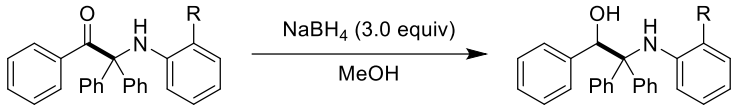

**Up-scaling experiment**




According to **GP3** from **1a** (1.028 g, 4.0 mmol), **2a** (1.8 g, 8.0 mmol, 2.0 equiv),

$Ru(bpy)_3(PF_6)_2$ (68.8 mg, 0.08 mmol, 2 mol%), $Cy_2NMe$ (2.6 mL, 12 mmol, 3.0 equiv) and $Cs_2CO_3$ (585 mg, 1.8 mmol, 45 mol%) in DMA (20 mL). The crude product was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 100:1) to give the desired product (1.263 g, 87% yield).

**Transformations**

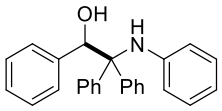



**3aa**, R = H
**3la**, R = Br

**4a**, R = H, 83%
**4b**, R = Br, 90%

**3aa** (72.6 mg, 0.2 mmol, 1.0 equiv) was dissolved in MeOH (2 mL), and $NaBH_4$ (22.7 mg, 0.6 mmol, 3.0 equiv) was added to the solution at room temperature. The reaction mixture was stirred for 4 h, and then evaporated under the reduced pressure. The residue was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 10:1) to give the final product **4a** as a white solid (61.2 mg, 83%). $\mathbf{R_f}$ = 0.25 (petroleum ether/EtOAc = 10:1).

**1,2,2-Triphenyl-2-(phenylamino)ethan-1-ol (4a)**

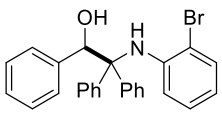



**4a**

**$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.68-7.59 (m, 2H), 7.35 (d, *J* = 6.8 Hz, 5H), 7.22 (m, 4H), 7.15 (t, *J* = 7.6 Hz, 2H), 6.92 (t, *J* = 7.6 Hz, 2H), 6.86 (d, *J* = 7.6 Hz, 2H), 6.57 (t, *J* = 7.2 Hz, 1H), 6.30 (d, *J* = 8.0 Hz, 2H), 5.50 (d, *J* = 4.4 Hz, 1H), 5.13 (s, 1H), 2.26 (d, *J* = 4.4 Hz, 1H). This compound has been reported already.[11]

**3la** (132.3 mg, 0.3 mmol, 1.0 equiv) was dissolved in MeOH (3 mL), and $NaBH_4$ (34 mg, 0.9 mmol, 3.0 equiv) was added to the solution at room temperature. The reaction mixture was stirred for 4 h, and then evaporated under the reduced pressure. The residue was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 20:1) to give the final product **4b** as a colorless oil (120 mg, 90%). $\mathbf{R_f}$ = 0.20 (petroleum ether/EtOAc = 30:1).

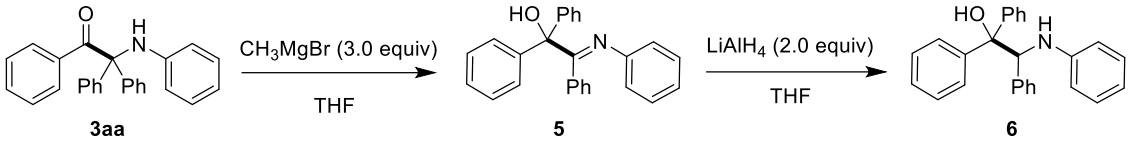
**2-((2-Bromophenyl)amino)-1,2,2-triphenylethan-1-ol (4b)**




**4b**

**$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.73-7.59 (m, 2H), 7.49-7.38 (m, 6H), 7.29 (dd, *J* = 6.0, 2.8 Hz, 4H), 7.21 (t, *J* = 7.6 Hz, 2H), 6.99 (d, *J* = 7.2 Hz, 2H), 6.74-6.64 (m, 1H), 6.46

(t, $J$ = 7.6 Hz, 1H), 6.00 (d, $J$ = 8.4 Hz, 1H), 5.90 (s, 1H), 5.56 (d, $J$ = 3.6 Hz, 1H), 2.32 (d, $J$ = 4.0 Hz, 1H). This compound has been reported already.[11]




3aa 5 6

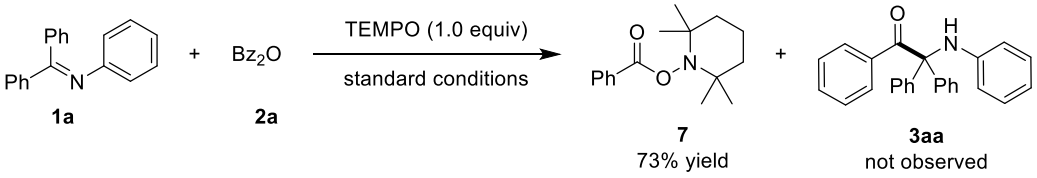
**(*E*)-1,1,2-Triphenyl-2-(phenylimino)ethan-1-ol (5):** To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **3aa** (109 mg, 0.3 mmol, 1.0 equiv). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. THF (3 mL) were added in the Schlenk tube and the mixture was cooled to 0 °C. $CH_3MgBr$ (0.9 mL, 0.9 mmol, 3.0 equiv) was added dropwise. After that, the solution was heated to reflux for 4 h. Upon completion of the reaction, the reaction mixture was quenched by $H_2O$ and extracted with ethyl acetate. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum ether/EtOAc = 100:1 to 20:1) to provide the desired product **5** as colorless oil (105 mg, 96%). $\mathbf{R_f}$ = 0.30 (petroleum ether/EtOAc = 30:1). **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.48-7.43 (m, 4H), 7.34-7.29 (m, 6H), 7.17-7.08 (m, 3H), 7.00-6.93 (m, 3H), 6.85 (brs, 1H), 6.75 (d, $J$ = 8.0 Hz, 2H), 6.51 (d, $J$ = 8.0 Hz, 2H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 173.9, 147.9, 142.0, 134.8, 129.3, 128.7, 128.5, 127.8, 127.7, 127.5, 124.3, 121.3, 82.2. **HRMS** (EI, m/z): calcd for $C_{26}H_{21}NO$: 363.1618, found: 363.1621 $[M]^+$.

**1,1,2-Triphenyl-2-(phenylamino)ethan-1-ol (6)**

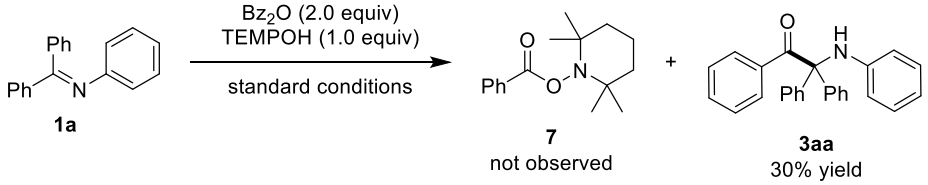
**5** (105 mg, 0.289 mmol, 1.0 equiv) was dissolved in THF (4 mL), and $LiAlH_4$ (21.9 mg, 0.578 mmol, 2.0 equiv) was added to the solution at room temperature. The reaction mixture was stirred for 10 min. Upon completion of the reaction, the reaction mixture was quenched by $H_2O$ and extracted with ethyl acetate. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by chromatography on silica gel (eluted with petroleum ether/EtOAc = 25:1) to give the desired product **6** as yellow solid (93.1 mg, 88%). $\mathbf{R_f}$ = 0.20 (petroleum ether/EtOAc = 10:1). **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.55 (dd, $J$ = 7.2, 1.6 Hz, 2H), 7.37-7.32 (m, 2H), 7.28 (dd, $J$ = 6.8, 2.0 Hz, 1H), 7.20-6.97 (m, 12H), 6.65 (t, $J$ = 7.2 Hz, 1H), 6.46 (d, $J$ = 8.4 Hz, 2H), 5.32 (s, 1H), 4.68 (brs, 1H), 2.78 (s, 1H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 146.6, 144.8, 143.9, 138.0, 129.1, 128.7, 128.4, 128.0, 127.9, 127.5, 127.4, 126.9 (x 2), 125.9, 117.4, 113.4, 81.2, 64.1. This compound has been reported already.[12]

## Mechanistic studies

### TEMPO radical-trapping experiment

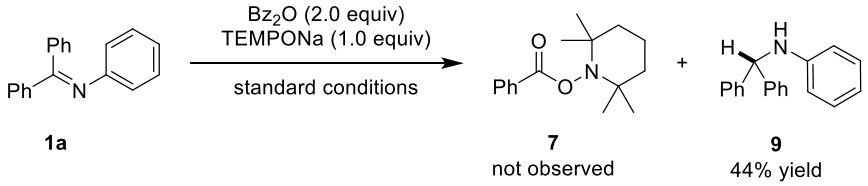



To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1a** (51.4 mg, 0.2 mmol, 1.0 equiv), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%) and TEMPO (31.3 mg, 0.2 mmol, 1.0 equiv). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LEDs and stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum ether/EtOAc = 100:1) to provide the desired product **7** as a yellow solid (36.1 mg, 73%). **$R_f$** = 0.40 (petroleum ether/EtOAc = 30:1).**$^1$H NMR** (400 MHz, $CDCl_3$) δ 8.21-8.00 (m, 2H), 7.56 (t, *J* = 7.2 Hz, 1H), 7.45 (t, *J* = 7.6 Hz, 2H), 1.84-1.64 (m, 3H), 1.62-1.53 (m, 2H), 1.44 (m, 1H), 1.27 (s, 6H), 1.11 (s, 6H). This compound has been reported already.[13]




To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1a** (51.4 mg, 0.2 mmol, 1.0 equiv), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%) and TEMPOH (31.5 mg, 0.2 mmol, 1.0 equiv). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LEDs and stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum

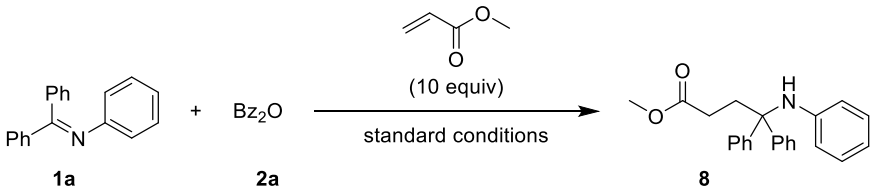
ether/EtOAc = 100:1) to provide product **3aa** as a yellow solid (22.1 mg, 30%).




**1a** **7** not observed **9** 44% yield

To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1a** (51.4 mg, 0.2 mmol, 1.0 equiv), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%) and TEMPONa (35.8 mg, 0.2 mmol, 1.0 equiv). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LEDs and stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum ether/EtOAc = 100:1) to provide product **9** as a white oil (23.1 mg, 44%). **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.31-7.13 (m, 10H), 7.07-6.99 (m, 2H), 6.61 (t, $J$ = 7.2 Hz, 1H), 6.46 (d, $J$ = 8.0 Hz, 2H), 5.41 (s, 1H), 4.14 (brs, 1H). This compound has been reported already.[11]

**Methyl acrylate radical-trapping experiment**

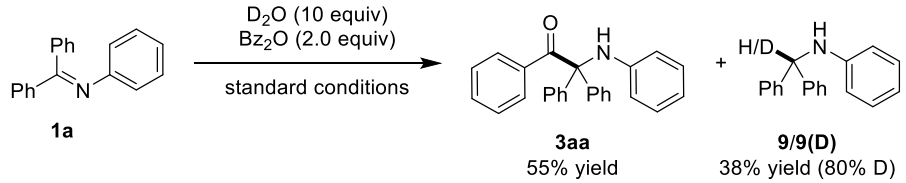



**1a** **2a** **8**

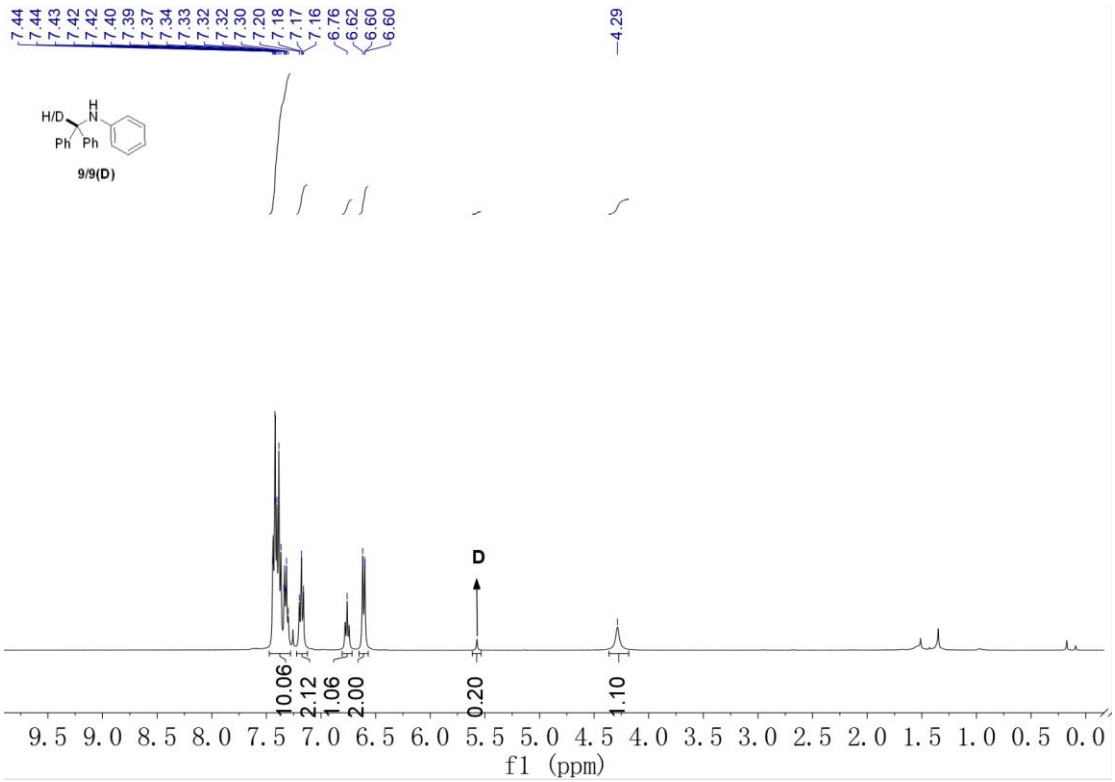
To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1a** (51.4 mg, 0.2 mmol, 1.0 equiv), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%) and methyl acrylate (180 μL, 2.0 mmol, 10 equiv). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LED sand stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum

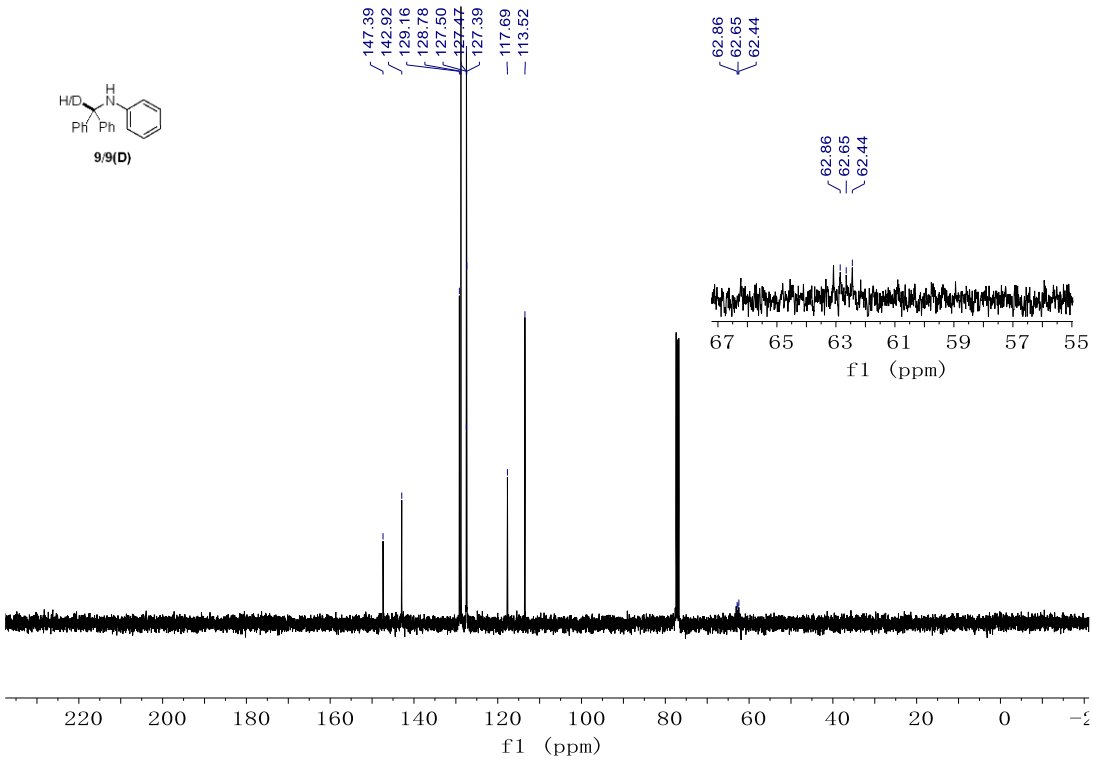
ether/EtOAc = 30:1) to provide the desired product **8** as a yellow oil (40.0 mg, 58%). $\mathbf{R_f}$ = 0.25 (petroleum ether/EtOAc = 30:1). **$^1$H NMR** (400 MHz, $CDCl_3$) δ 7.60-7.54 (m, 4H), 7.36 (t, *J* = 7.6 Hz, 4H), 7.29-7.22 (m, 2H), 7.09-7.01 (m, 2H), 6.70 (t, *J* = 7.6 Hz, 1H), 6.48 (d, *J* = 7.6 Hz, 2H), 4.72 (s, 1H), 3.62 (s, 3H), 3.03 -2.93 (m, 2H), 2.30 (m, 2H). **$^{13}$C NMR** (101 MHz, $CDCl_3$) δ 174.1, 145.4, 145.2, 128.8, 128.6, 126.9, 126.8, 118.1, 116.2, 64.7, 51.7, 32.5, 29.3. **HRMS** (EI, m/z): calcd for $C_{23}H_{23}NO_2$: 345.1723, found: 345.1725 $[M]^+$.

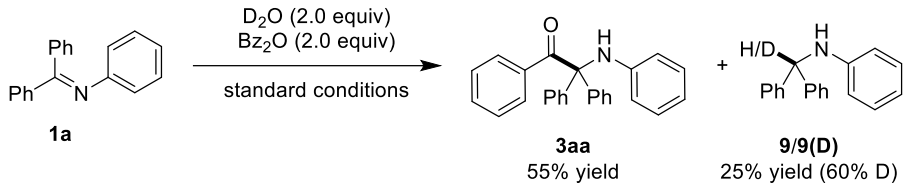
**Deuterium-labeling experiment**



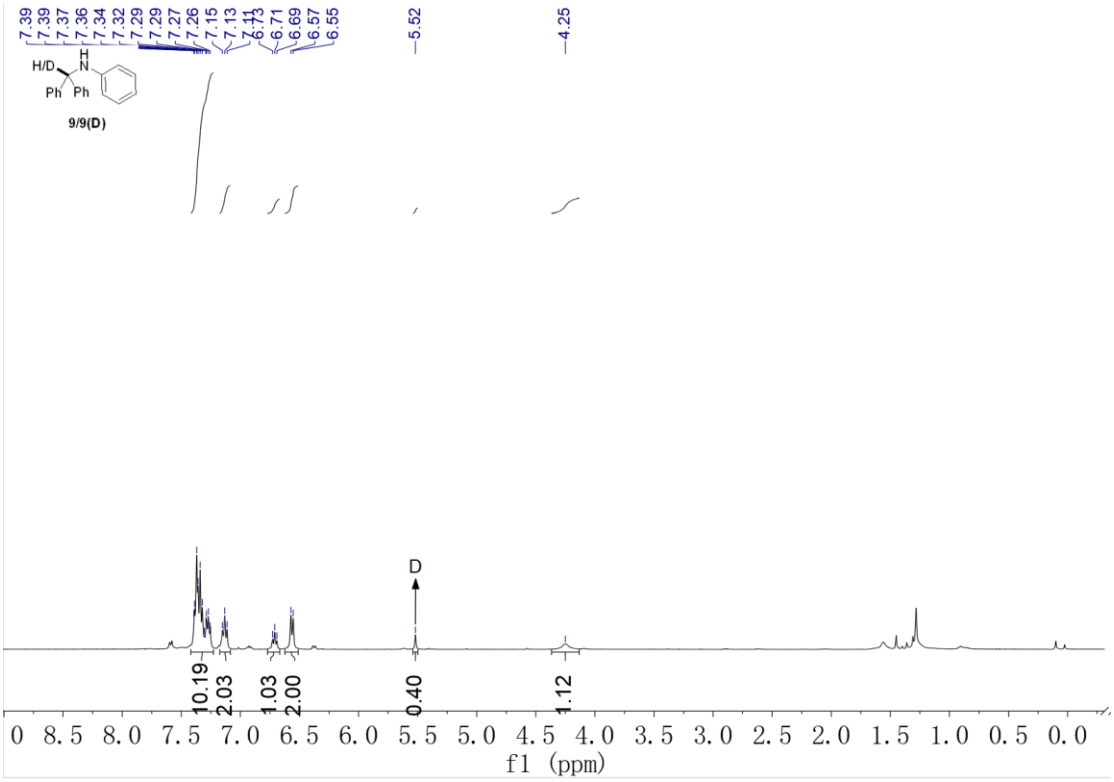

To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1a** (51.4 mg, 0.2 mmol, 1.0 equiv), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%) and $D_2O$ (36 μL, 2.0 mmol, 10 equiv). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LED sand stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum ether/EtOAc = 30:1) to provide the product **3aa** (40.0 mg, 55%) and **9/9(D)** (20.1 mg, 38%, 80% D) as a white oil. **HRMS** (EI, m/z): calcd for $C_{19}H_{16}DN$: 260.1424, found: 260.1422 $[M]^+$. This compound has been reported already.[11]

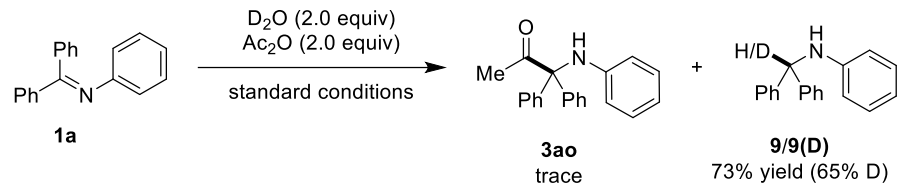

7.44
7.44
7.43
7.42
7.42
7.40
7.39
7.37
7.34
7.33
7.32
7.32
7.30
7.20
7.18
7.17
7.16
6.76
6.62
6.60
6.60
4.29
H/D
H
N
Ph
Ph
9/9(D)
D
10.06
2.12
1.06
2.00
0.20
1.10
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)


147.39
142.92
129.16
128.78
127.50
127.47
127.39
117.69
113.52
62.86
62.65
62.44
H/D
H
N
Ph
Ph
9/9(D)
62.86
62.65
62.44
67 65 63 61 59 57 55
f1 (ppm)
220 200 180 160 140 120 100 80 60 40 20 0
f1 (ppm)

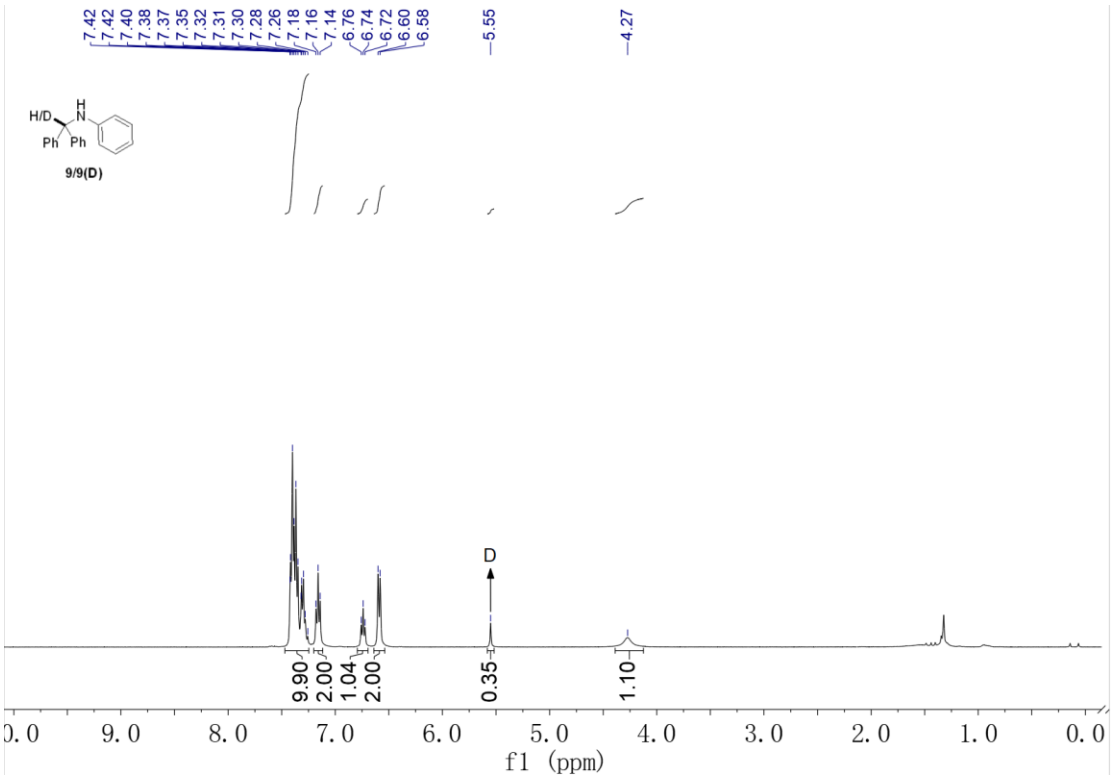



To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1a** (51.4 mg, 0.2 mmol, 1.0 equiv), **2a** (90.4 mg, 0.4 mmol, 2.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%) and $D_2O$ (7.2 μL, 0.4 mmol, 2.0 equiv). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LED sand stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum ether/EtOAc = 30:1) to provide the product **3aa** (40.0 mg, 55%) and **9/9(D)** (13.0 mg, 25%, 60% D) as a white oil.

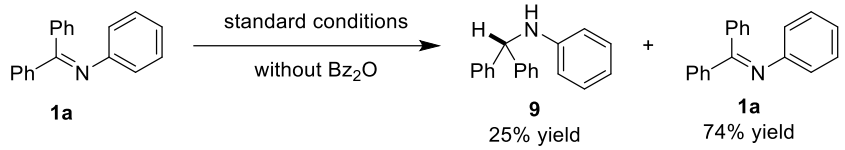





To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1a** (51.4 mg, 0.2 mmol, 1.0 equiv), $Ac_2O$ (38.0 μL, 0.4 mmol, 2.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%) and $D_2O$ (7.2 μL, 0.4 mmol, 2.0 equiv). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LED sand stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum ether/EtOAc = 30:1) to provide the product **9/9(D)** (37.9 mg, 73%, 65% D) as a white oil.

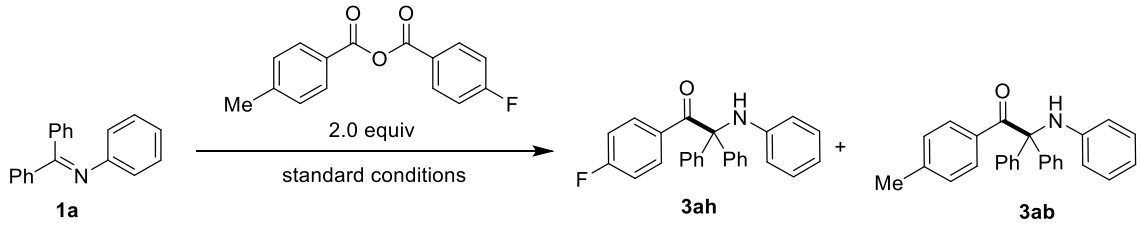


**Reaction without $Bz_2O$**

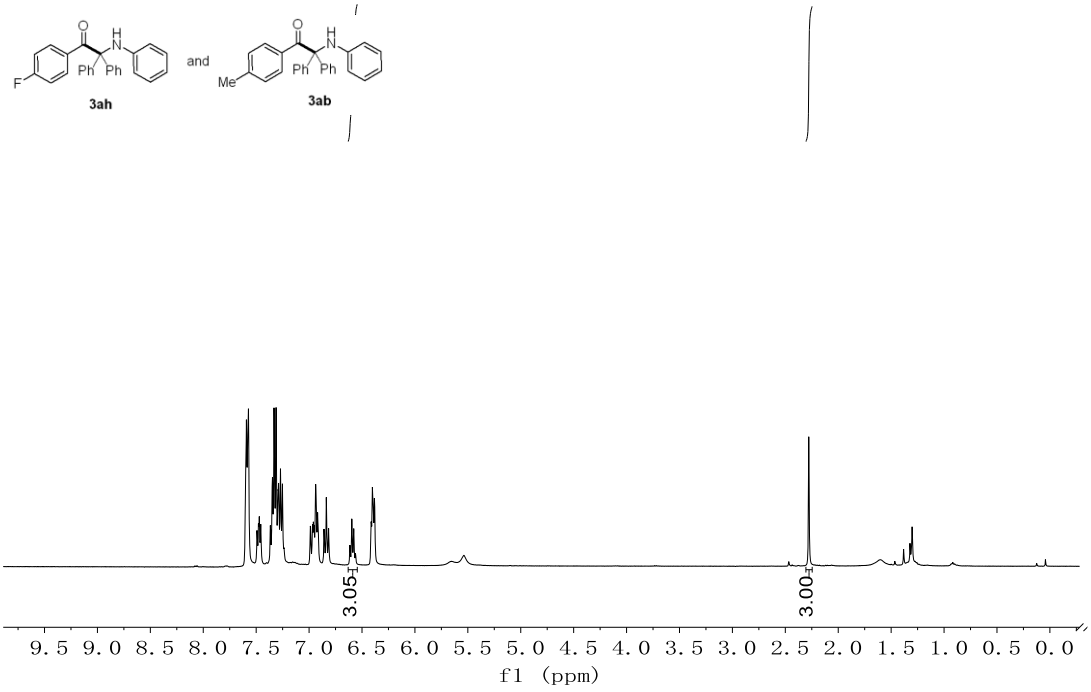



To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1a** (51.4 mg, 0.2 mmol, 1.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%) and $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LED sand stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum ether/$CH_2Cl_2$ = 5:1) to provide the desired product **9** as a white oil (13.2 mg, 25%). This compound has been reported already.[11]

**Mixed anhydride selectivity experiment**




To an oven-dried Schlenk-tube equipped with magnetic stirring was treated with **1a** (51.4 mg, 0.2 mmol, 1.0 equiv), mixed anhydride (145 mg, 0.4 mmol, 2.0 equiv), $Cs_2CO_3$ (29.3 mg, 0.09 mmol, 45 mol%), $Ru(bpy)_3(PF_6)_2$ (3.4 mg, 0.004 mmol, 2 mol%). The Schlenk tube was put on vacuum and backfilled with nitrogen three times. $Cy_2NMe$ (128 μL, 0.6 mmol, 3.0 equiv) and DMA (1 mL) were added in the Schlenk tube. The mixture was placed under a 30 W blue LED sand stirred at ambient temperature. The reaction progress was monitored by TLC. Upon completion of the reaction, ethyl acetate was added to the mixture for extraction. The combined organic layer was dried with anhydrous $Na_2SO_4$ and evaporated under vacuum. The residue was purified by silica gel chromatography (eluted with petroleum ether/EtOAc = 30:1) to provide the mixed product **3ah** and **3ab** (50.2 mg, **3ah**:**3ab** = 2:1) as a yellow solid. According to the NMR yield, **3ab** (16.5 mg, 22%), **3ah** (33.7mg, 44%).

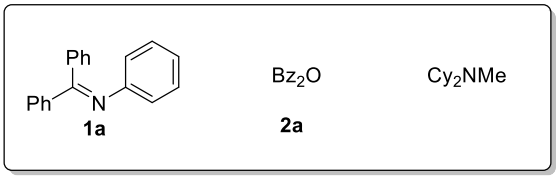



**Stern-Volmer fluorescence quenching study**

The rate of quenching ($k_q$) was determined using Stern-Volmer relationship:

$$\frac{I_0}{I} = K_q \times \tau_0 \times [quencher] + 1$$

Where $I_0$ is the fluorescence intensity without the quencher, $I$ is the fluorescence intensity with the quencher, and $\tau_0$ is the lifetime of the photoexcited state of the photocatalyst. The excited state lifetime of $Ru(bpy)_3(PF_6)_2$ in MeCN is 153 ns[14]. In this study the compounds below are tested.




**Evaluation of 1a as potential quencher for photoexcited $Ru(bpy)_3(PF_6)_2$**

$Ru(bpy)_3(PF_6)_2$ (1.72 mg, 0.002 mmol) was dissolved in 2.0 mL DMA to prepare a 0.001 M solution. 50 µL of this solution and DMA (2.0 mL) were added to each of a set of 7 cuvettes. Subsequently, the solution of quencher **1a** in DMA (3.0 mL, 0.01 M) was added in increasing amounts (0, 100 µL, 200 µL, 300 µL, 500 µL, 800µL, 1200 µL) to the cuvette. All solutions were excited at 450 nm and the fluorescence emission was

detected at 600 nm. The ratio of the maximum fluorescence emission intensities maximum between samples without and with quencher were plotted against the quencher concentration to generate the Stern-Volmer plots below.

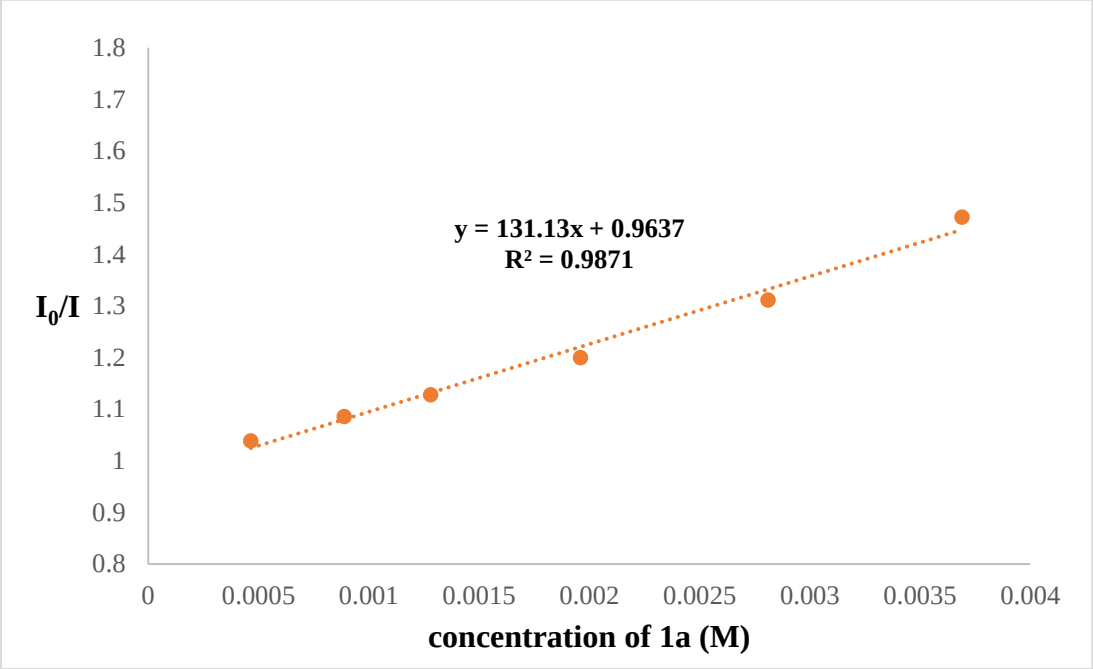



**Figure S2.** Stern-Volmer quenching experiment of $Ru(bpy)_3(PF_6)_2$ and **1a**. $k_q$ is $8.6 \times 10^8\ M^{-1}s^{-1}$.

**Evaluation of 2a as potential quencher for photoexcited $Ru(bpy)_3(PF_6)_2$**

$Ru(bpy)_3(PF_6)_2$ (1.72 mg, 0.002 mmol) was dissolved in 2.0 mL DMA to prepare a 0.001 M solution. 50 µL of this solution and DMA (2.0 mL) were added to each of a set of 7 cuvettes. Subsequently, the solution of quencher **2a** in DMA (3.0 mL, 0.01 M) was added in increasing amounts (0, 100 µL, 200 µL, 300 µL, 500 µL, 800µL, 1200 µL) to the cuvette. All solutions were excited at 450 nm and the fluorescence emission was detected at 600 nm. The ratio of the maximum fluorescence emission intensities maximum between samples without and with quencher were plotted against the quencher concentration to generate the Stern-Volmer plots below.

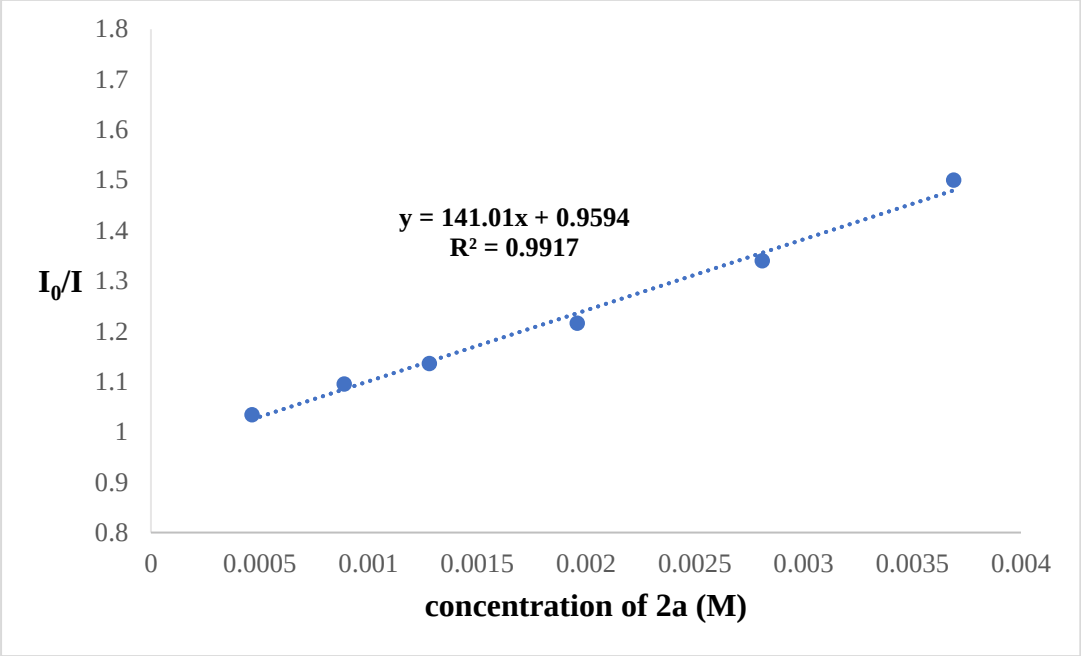



**Figure S3.** Stern-Volmer quenching experiment of $Ru(bpy)_3(PF_6)_2$ and **2a**. $k_q$ is $9.2 \times 10^8$ $M^{-1}s^{-1}$.

**Evaluation of $Cy_2NMe$ as potential quencher for photoexcited $Ru(bpy)_3(PF_6)_2$**

$Ru(bpy)_3(PF_6)_2$ (1.72 mg, 0.002 mmol) was dissolved in 2.0 mL DMA to prepare a 0.001 M solution. 50 µL of this solution and DMA (2.0 mL) were added to each of a set of 7 cuvettes. Subsequently, the solution of quencher $Cy_2NMe$ in DMA (3.0 mL, 0.01 M) was added in increasing amounts (0, 100 µL, 200 µL, 300 µL, 500 µL, 800µL, 1200 µL) to the cuvette. All solutions were excited at 450 nm and the fluorescence emission was detected at 600 nm. The ratio of the maximum fluorescence emission intensities maximum between samples without and with quencher were plotted against the quencher concentration to generate the Stern-Volmer plots below.

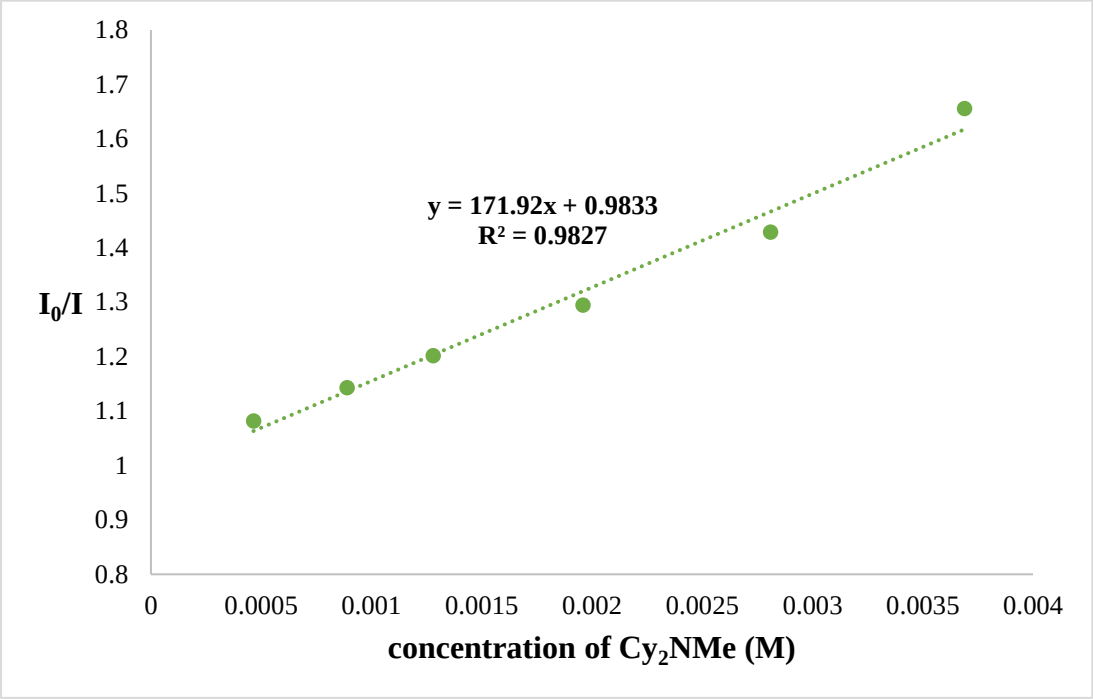



**Figure S4.** Stern-Volmer quenching experiment of $Ru(bpy)_3(PF_6)_2$ and $Cy_2NMe$. $k_q$ is $1.1 \times 10^9$ $M^{-1}s^{-1}$.

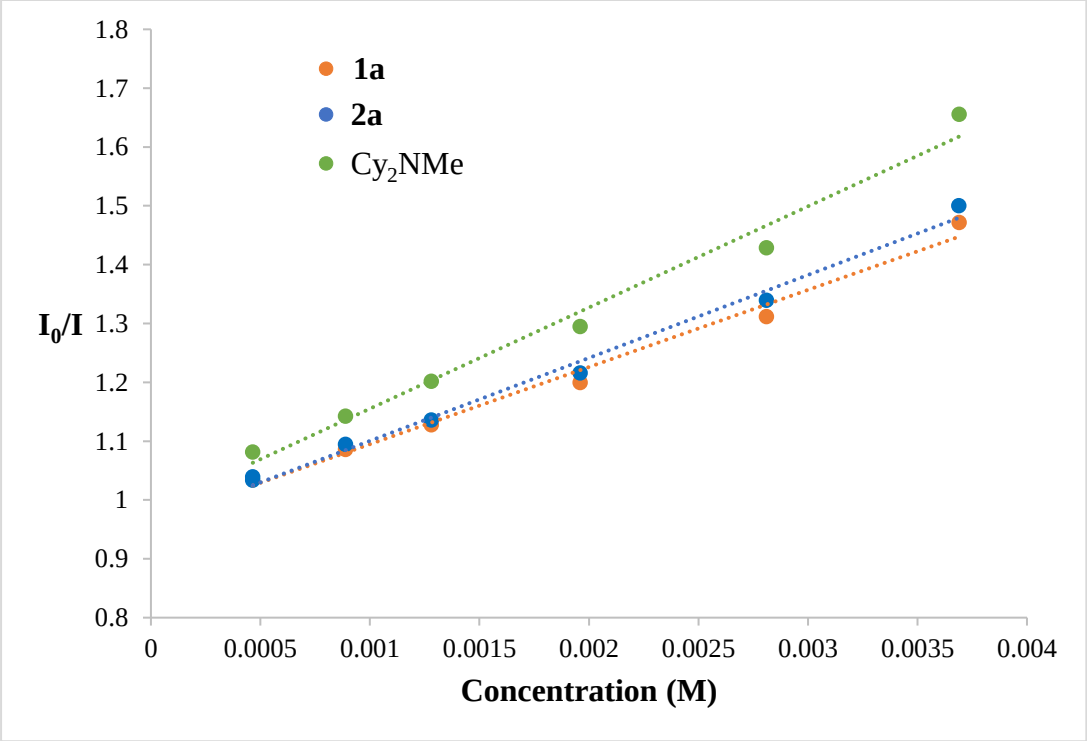



**Figure S5.** The overlap of all the Stern-Volmer quenching experiments.

**Plausible mechanism pathway B**

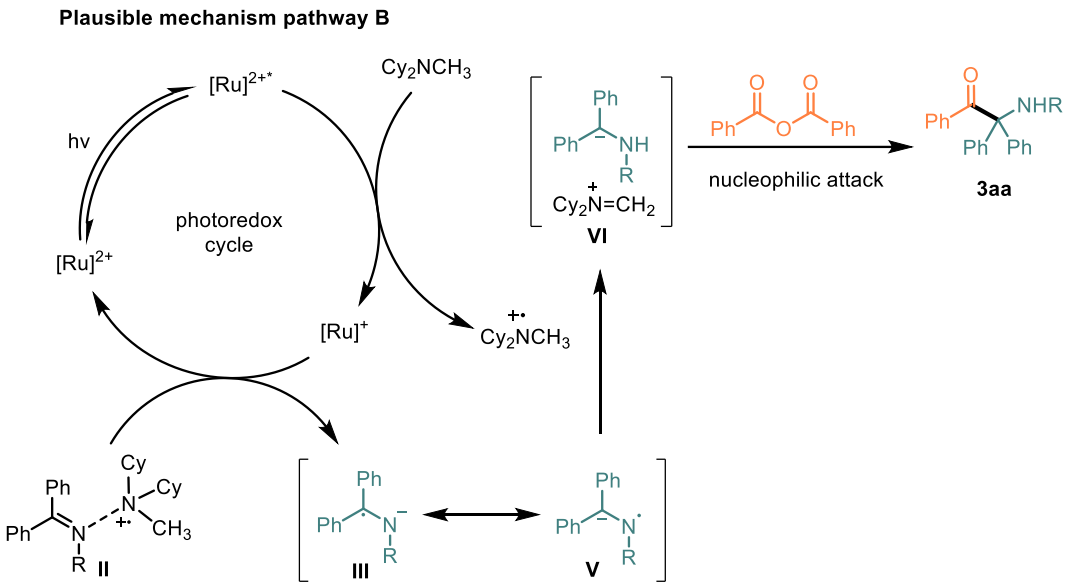



**Figure S6.** Carbanion nucleophilic mechanism pathway

Under the irradiation of blue LEDs, the excited photocatalyst $[Ru]^{2+*}$ was quenched by the sacrificial $Cy_2NCH_3$ to form the reduced state $[Ru]^{+}$ ($E_{1/2}^{II^*/I}$= 0.77 V *vs*. SCE)[15] and $[Cy_2NCH_3]^{+\bullet}$. imine **1a** was activated by the amine radical cation, $[Cy_2NCH_3]^{+\bullet}$, to form a 2-center-3-electron **II**, which subsequently underwent a reduction by $[Ru]^{+}$ via SET process, affording the α-amino radical anion **III/V** and regenerating the ground state photocatalyst $[Ru]^{2+}$ ($E_{1/2}^{I/II}$= -1.33 V *vs*. SCE).[15] Due to the high reactivity of the N-centered radical, [11] **V** was instantaneously quenched by $[Cy_2NCH_3]^{+\bullet}$ via HAT process to form α-amino carbanion **VI**. Finally, α-amino carbanion **VI** attacked the anhydride via nucleophilic addition, affording the desired α-amino ketone **3aa**.

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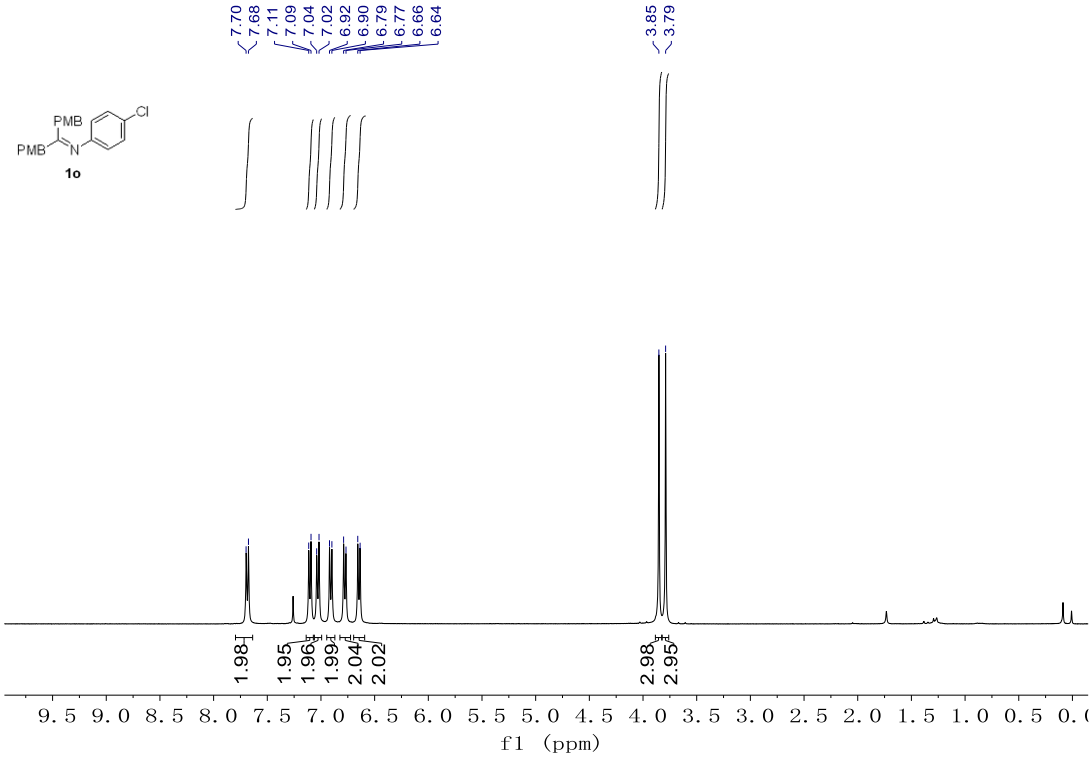
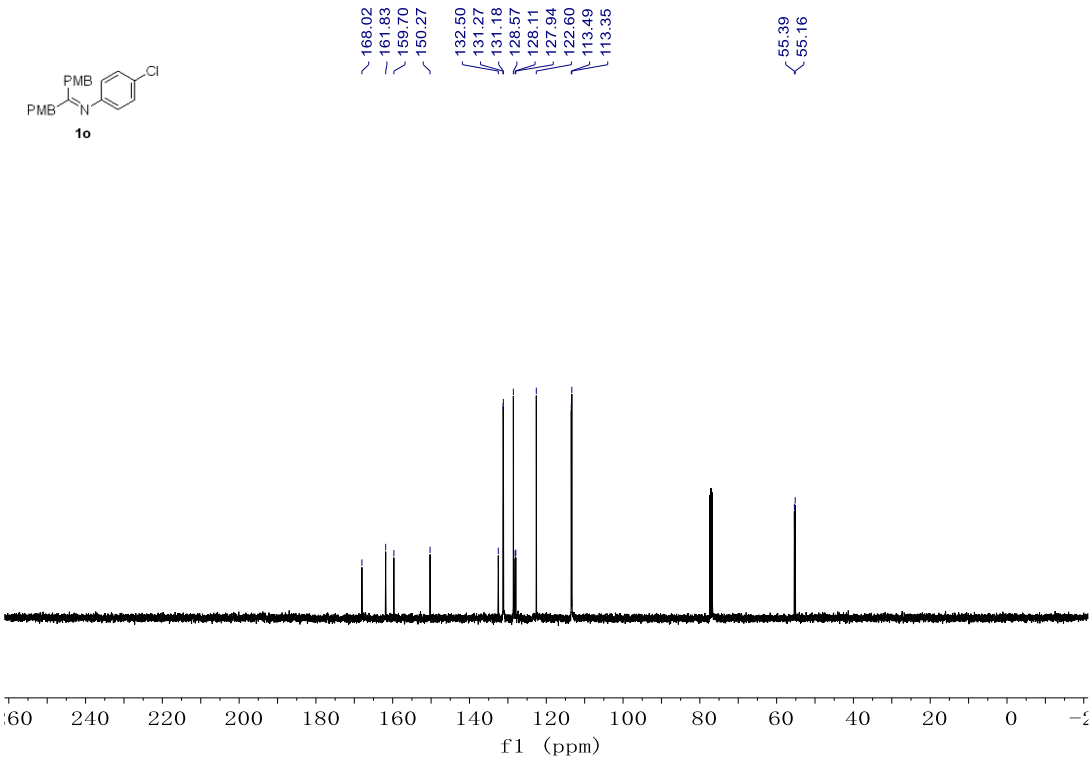
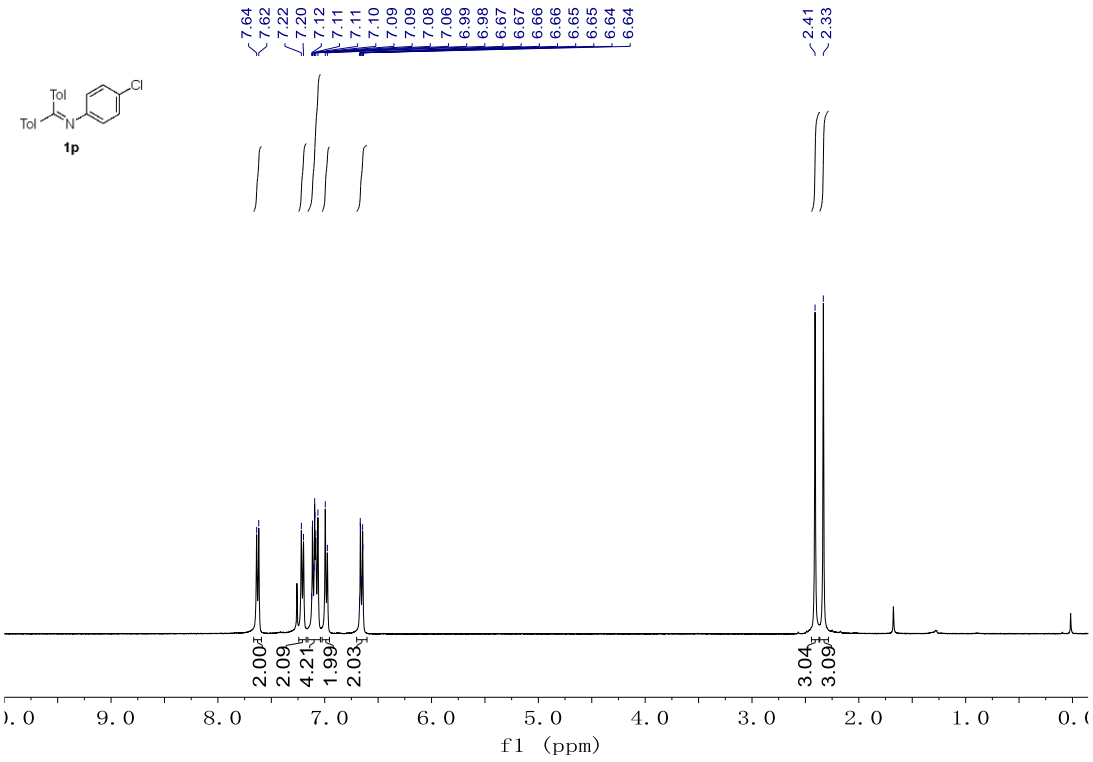
## Copies of NMR spectra

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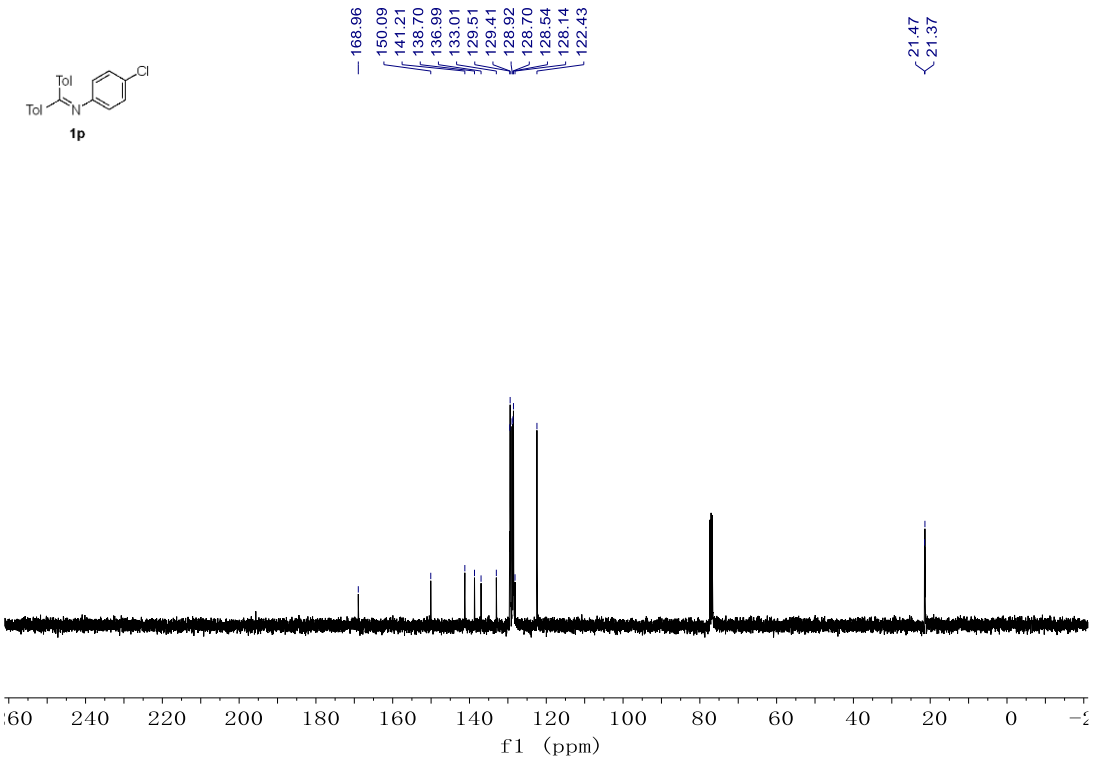
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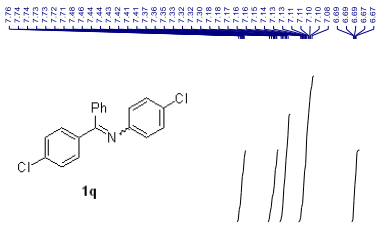
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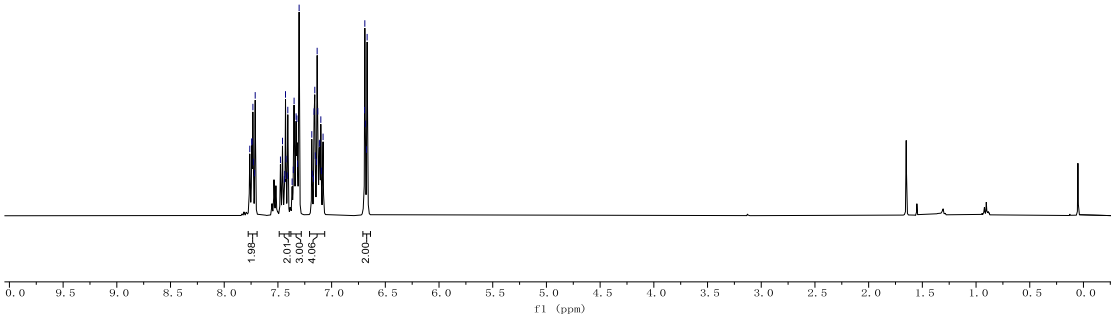
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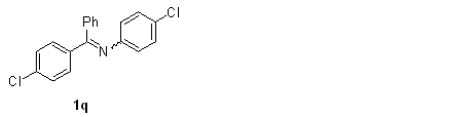
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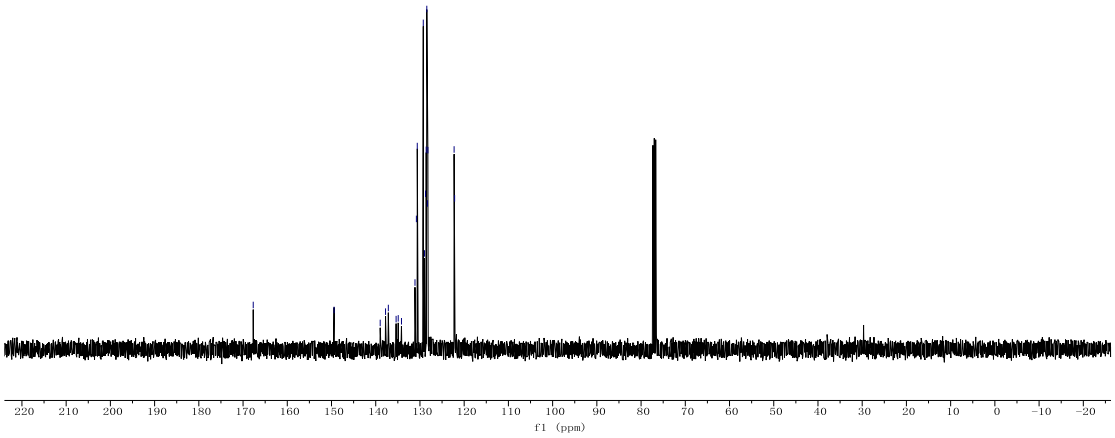
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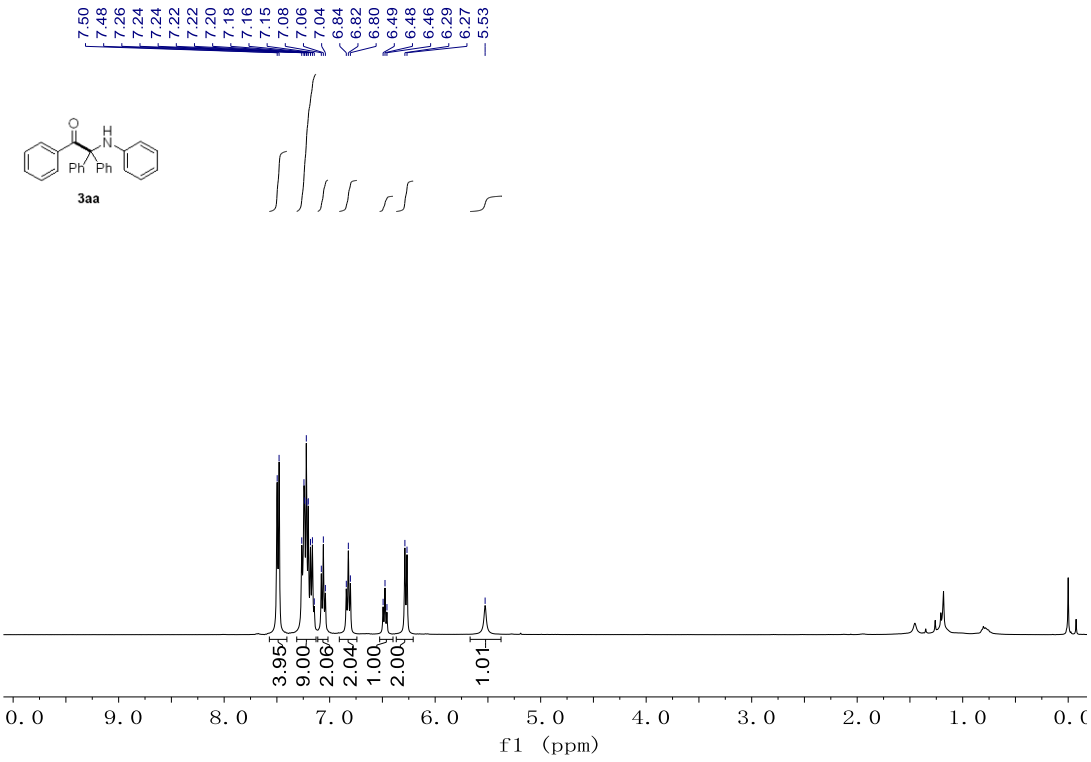
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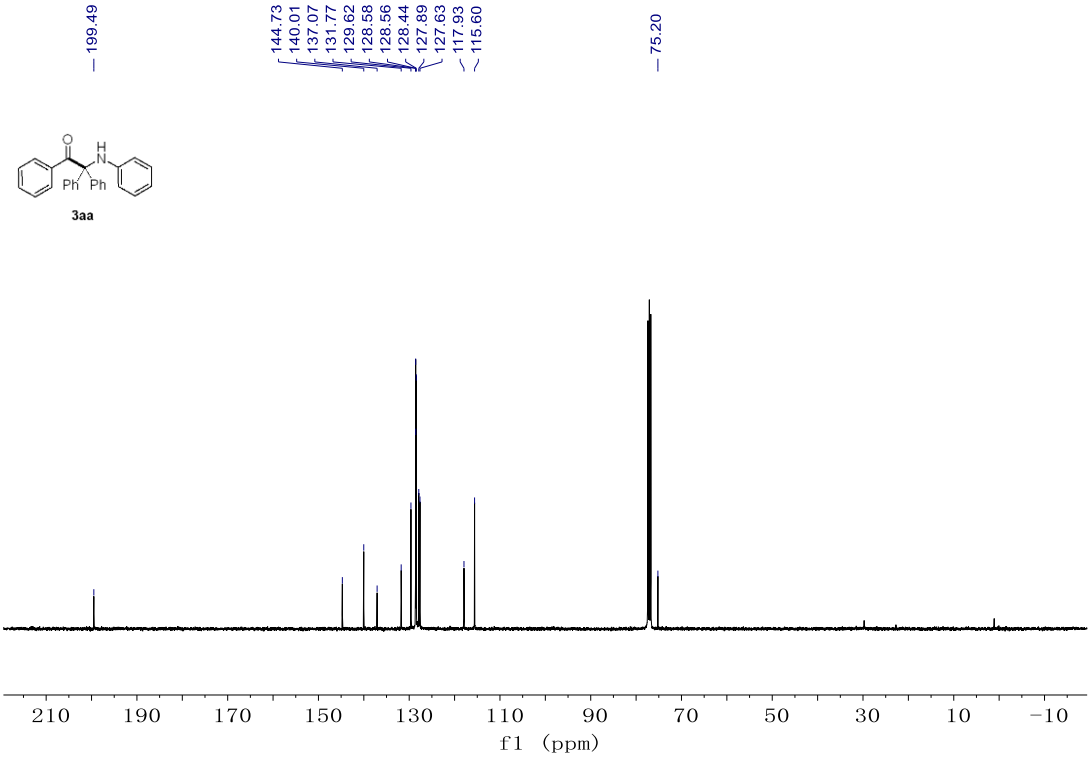
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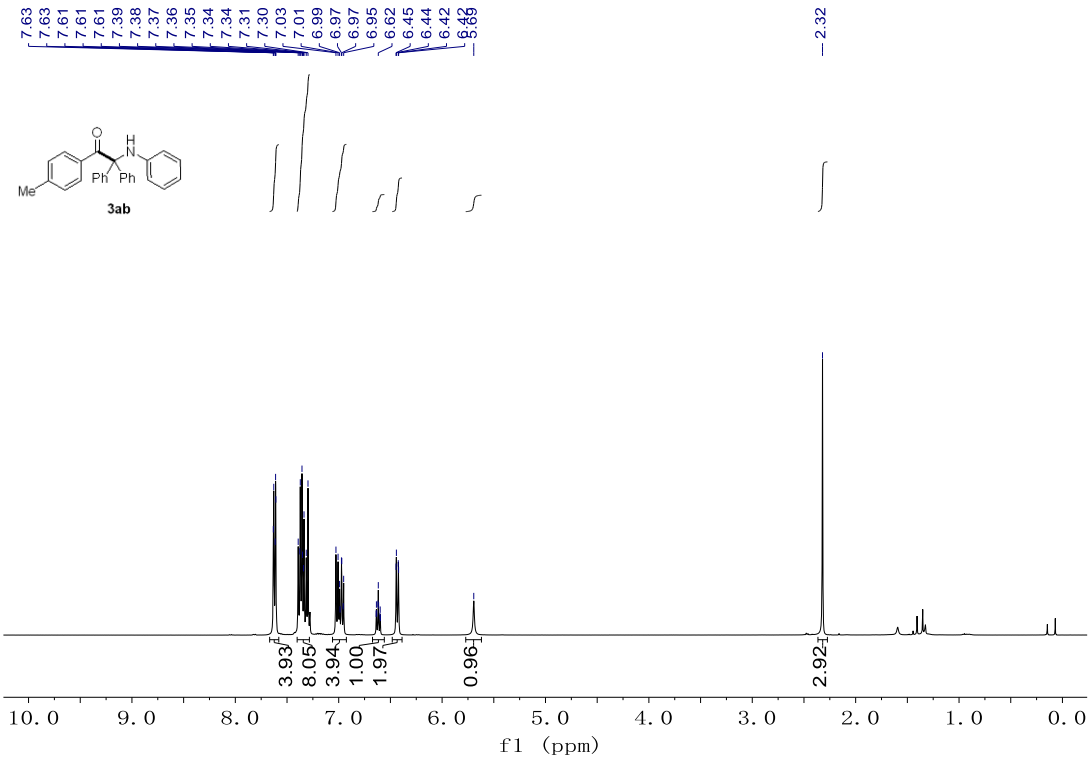
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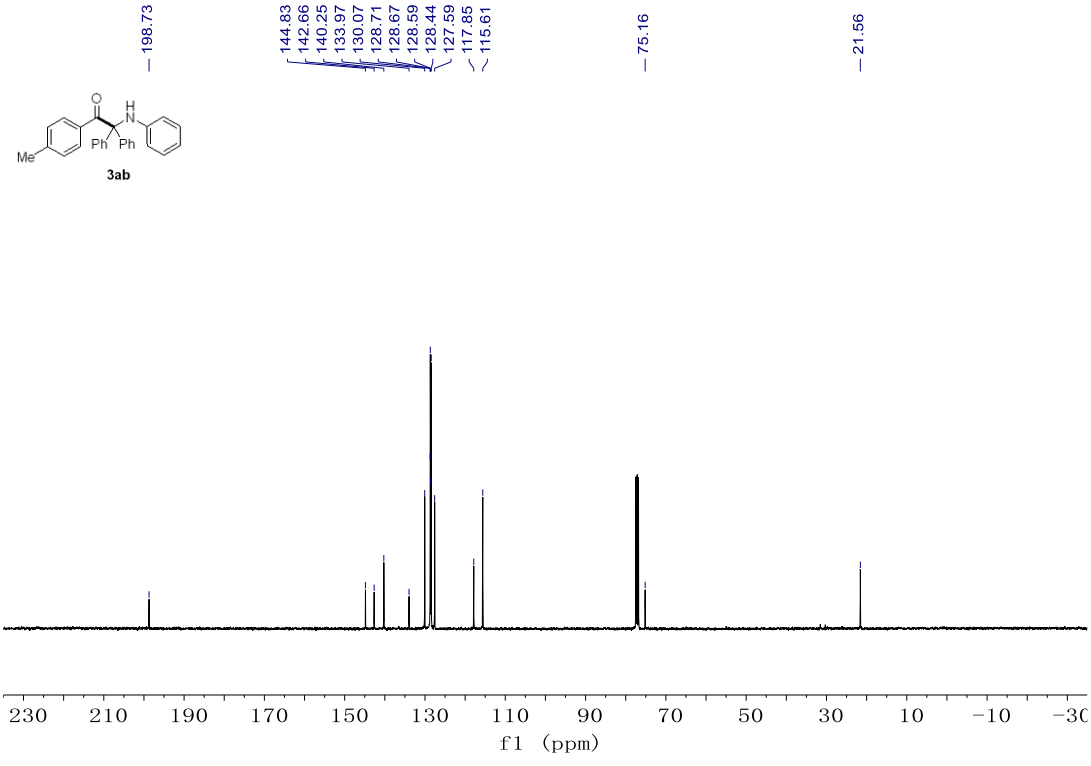
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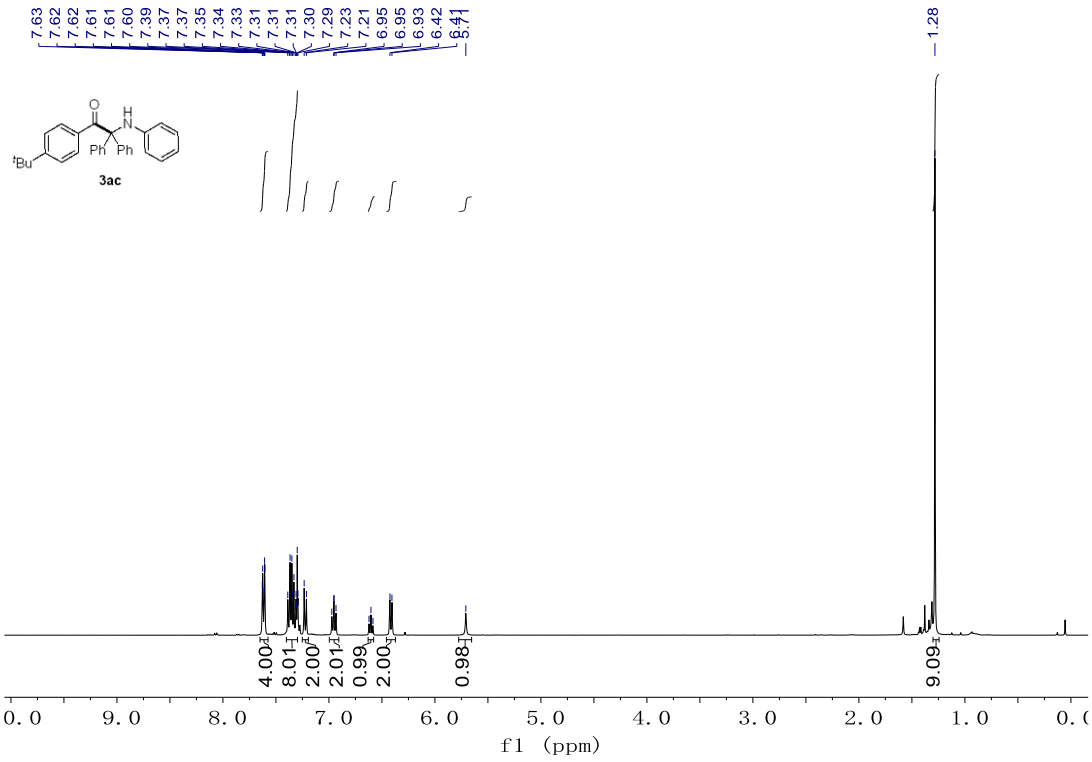
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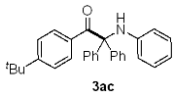
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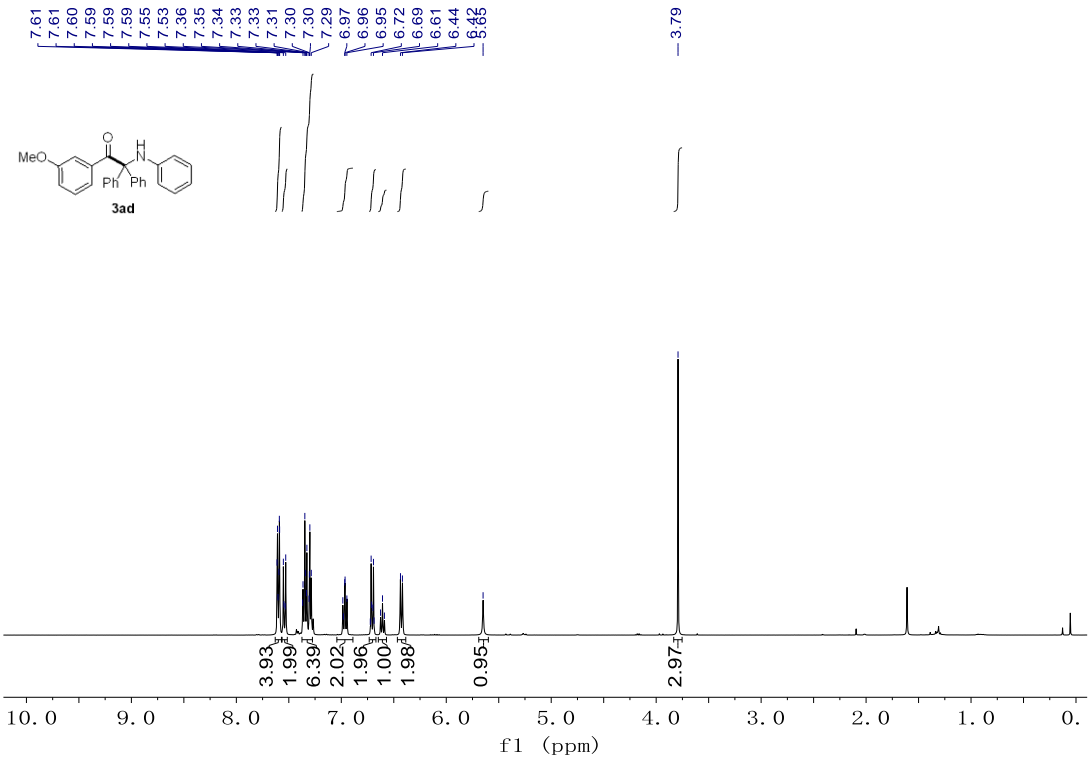
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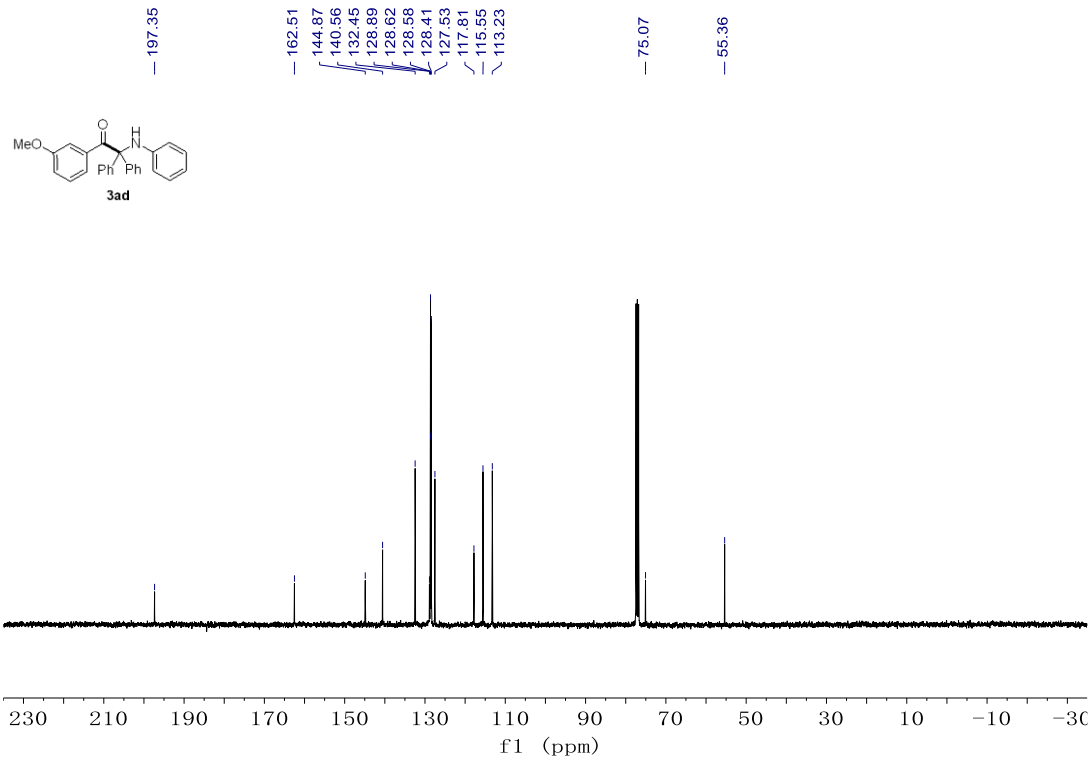
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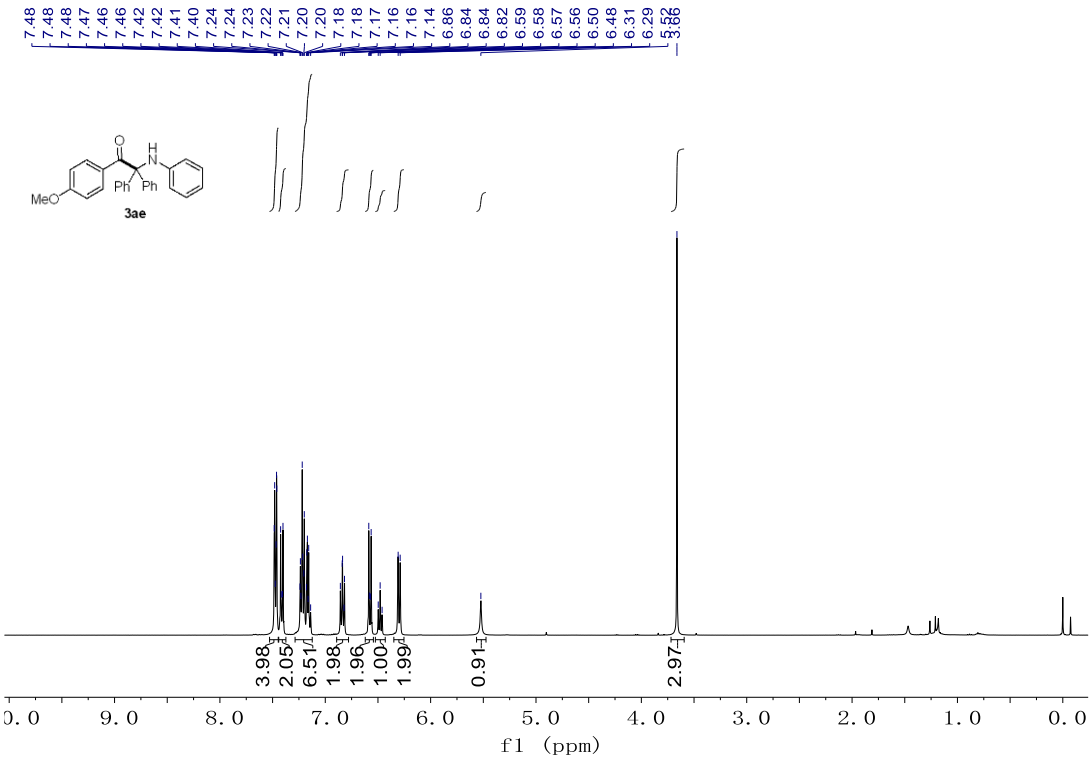
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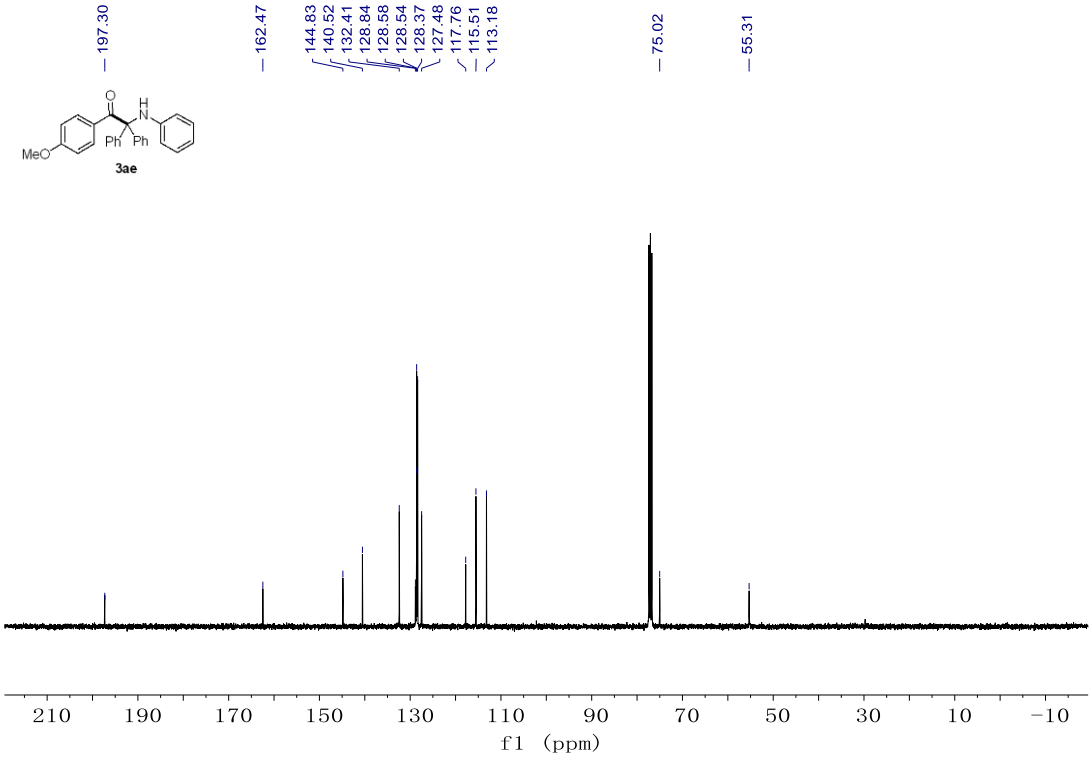
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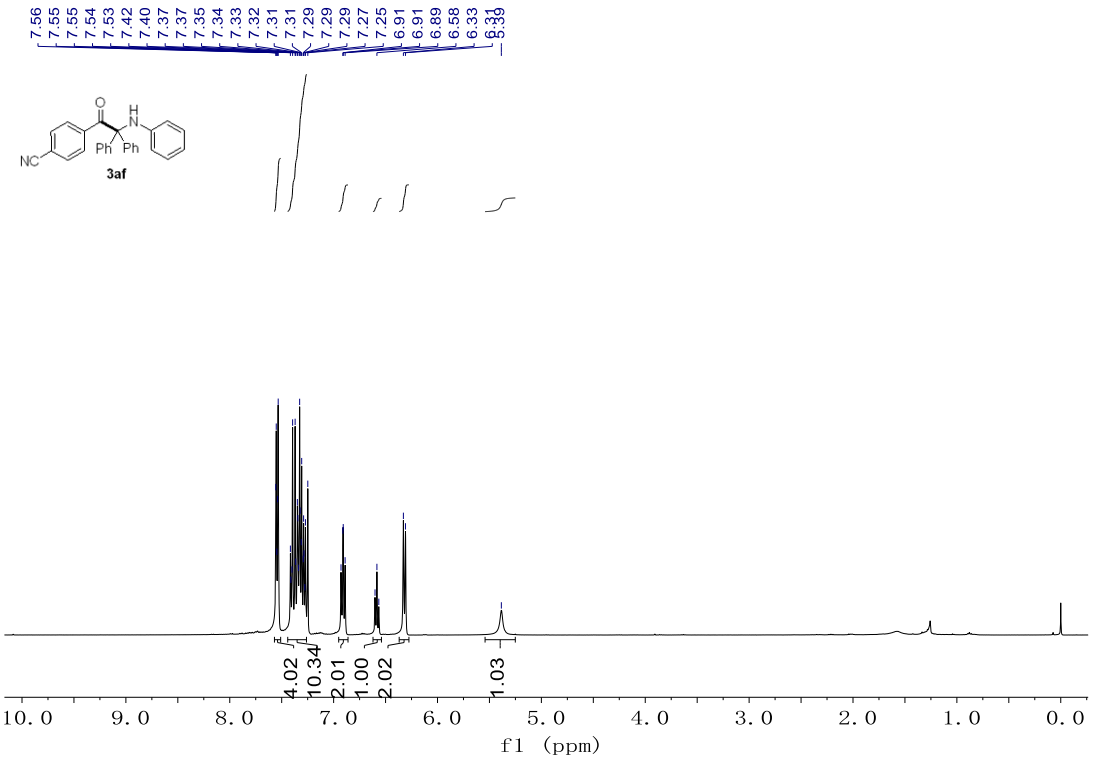
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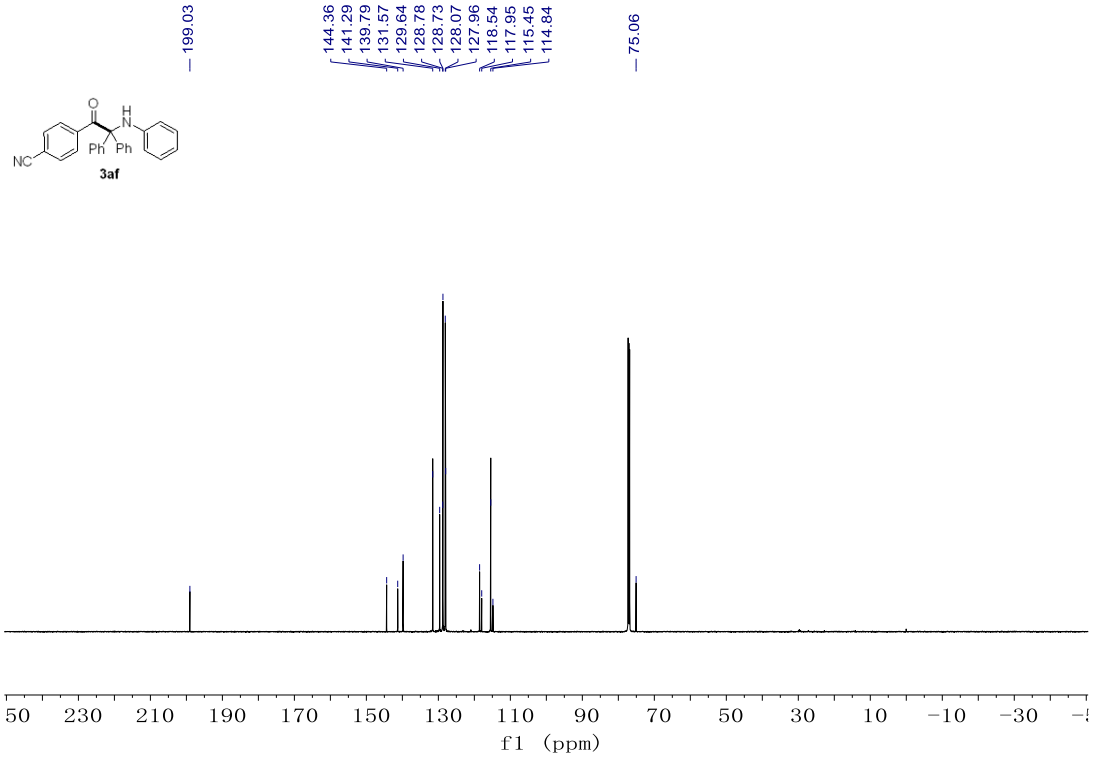
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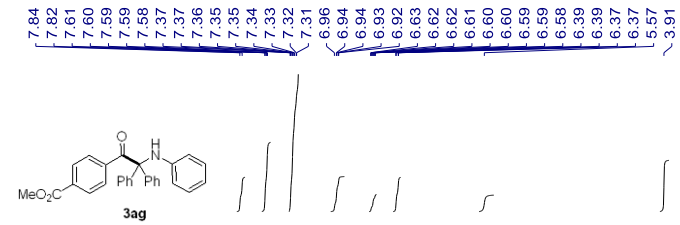
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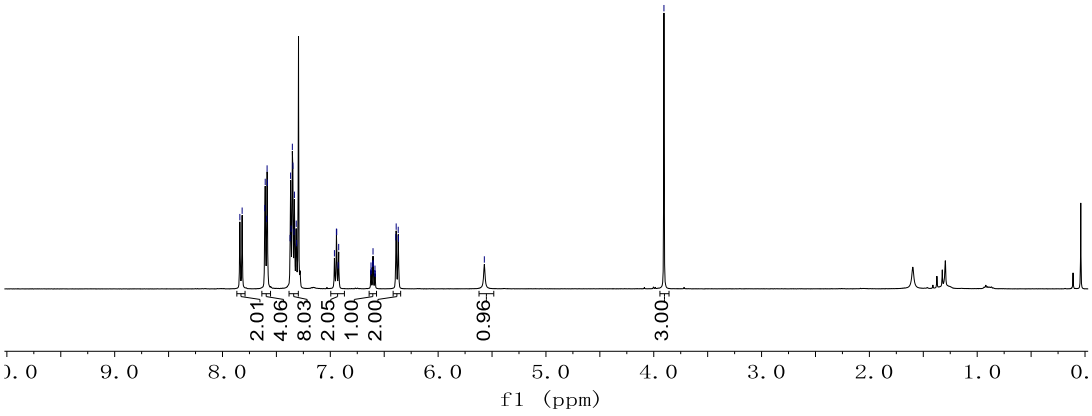
Ph
Ph
3ag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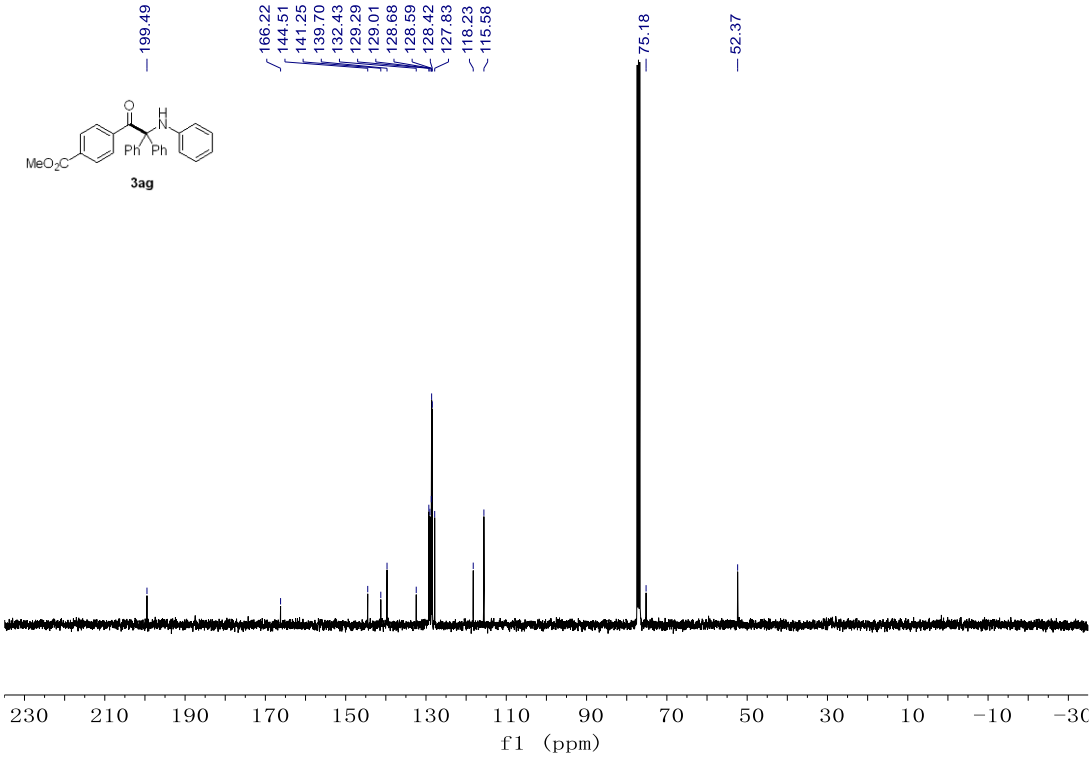
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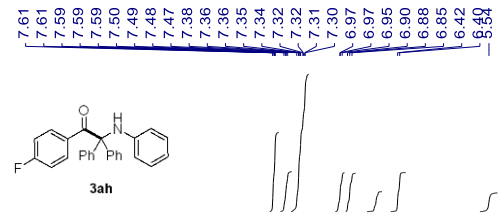
MeO2C
Ph
Ph
3ag
f1 (ppm)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7.30
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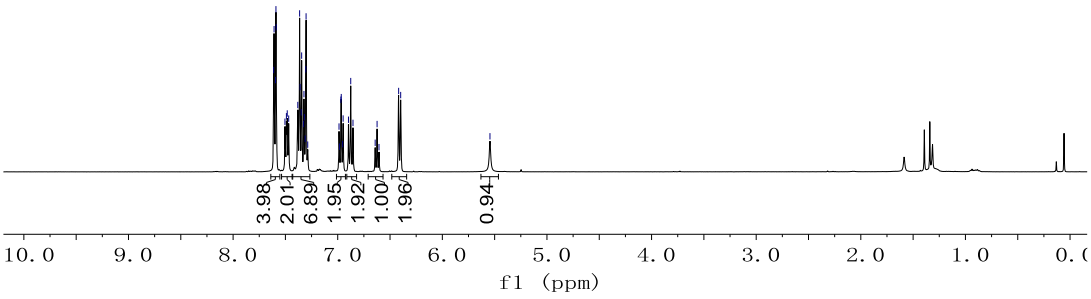
O
H
N
Ph
Ph
F
3ah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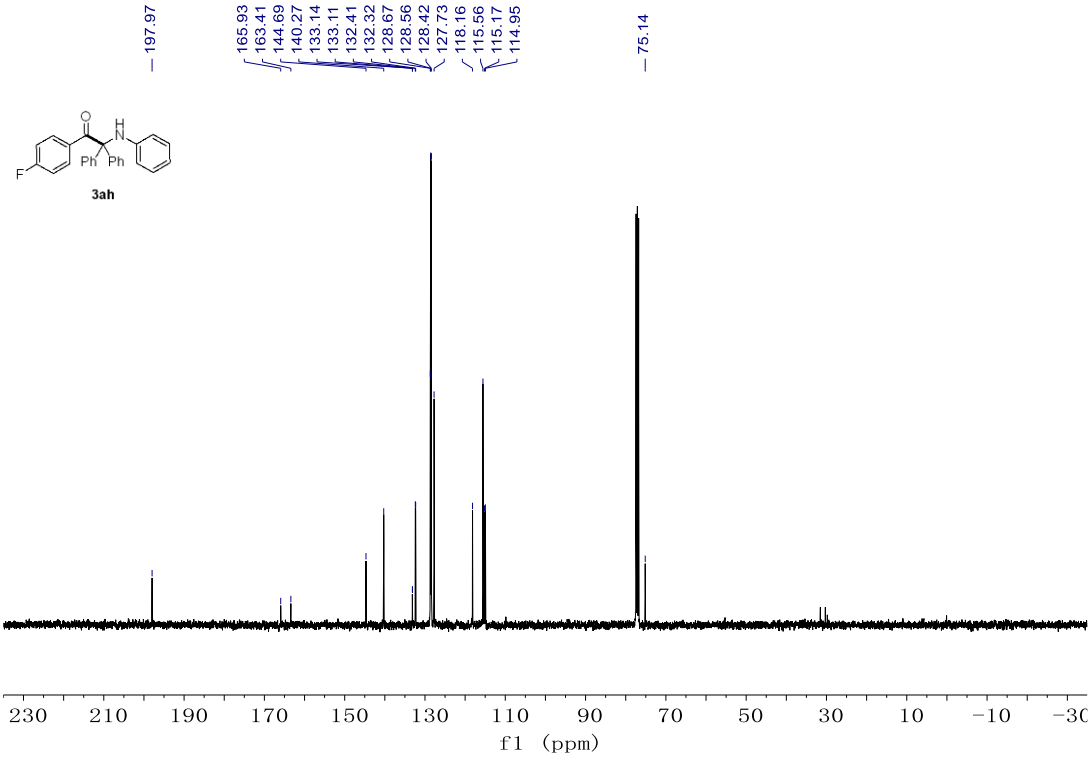
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114.95
75.14
O
H
N
Ph
Ph
F
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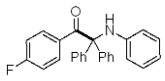
−10
−30
f1 (ppm)




3ah

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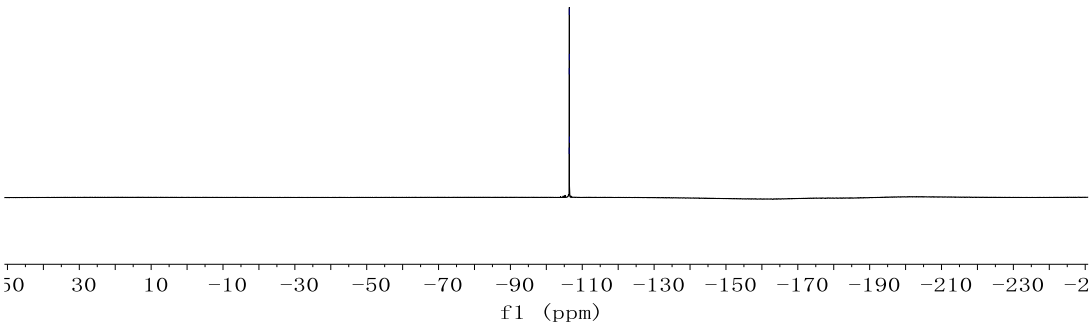


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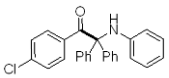
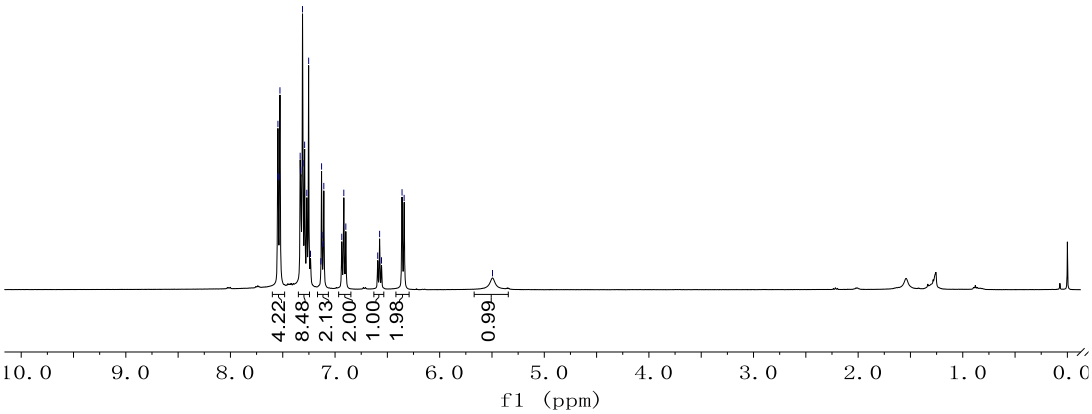
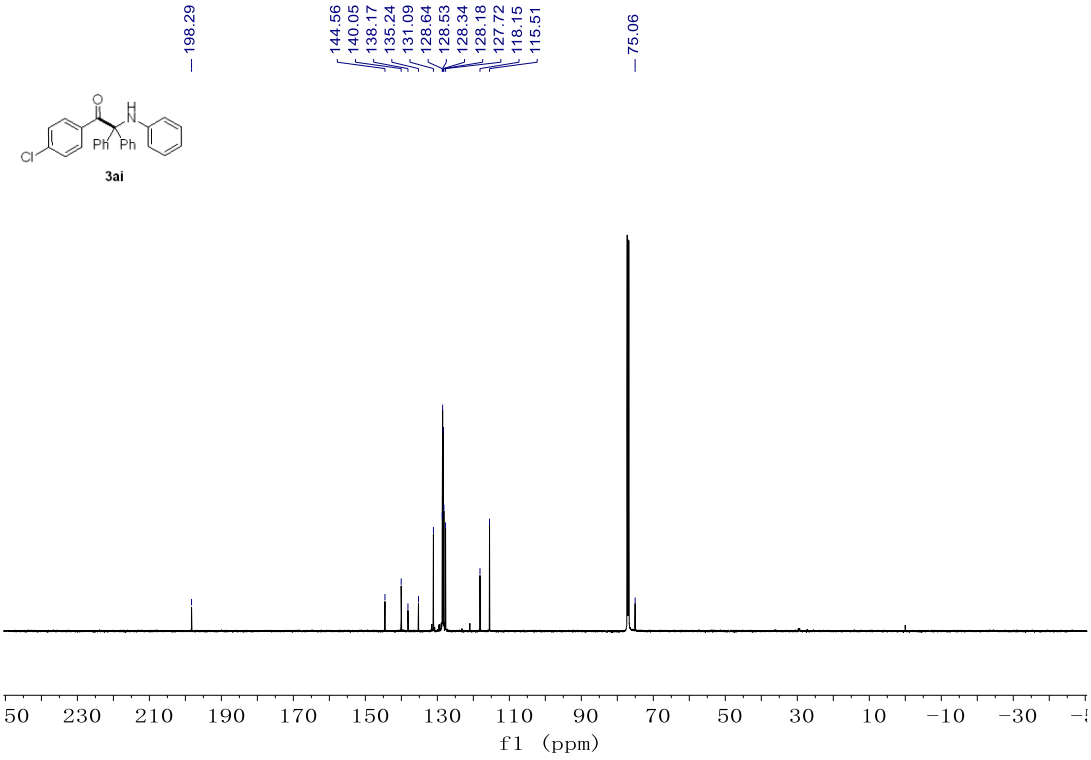



3ai

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118.15
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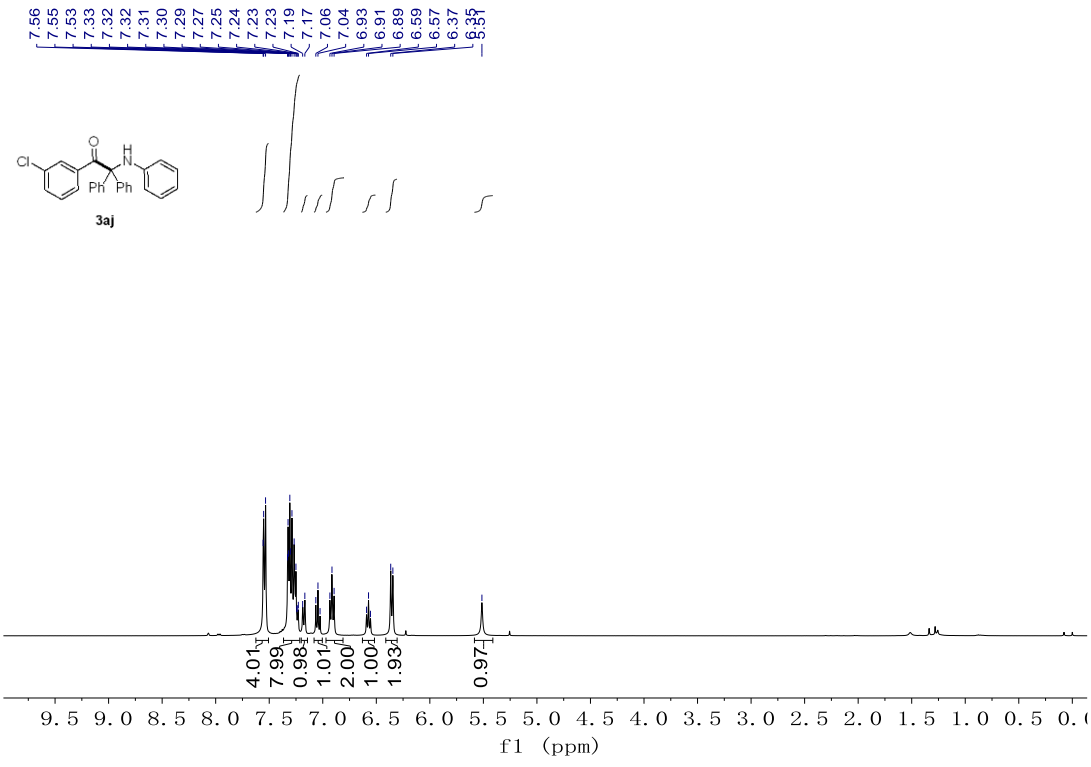
f1 (ppm)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7.25
7.24
7.23
7.23
7.19
7.17
7.06
7.04
6.93
6.91
6.89
6.59
6.57
6.37
6.35
5.51
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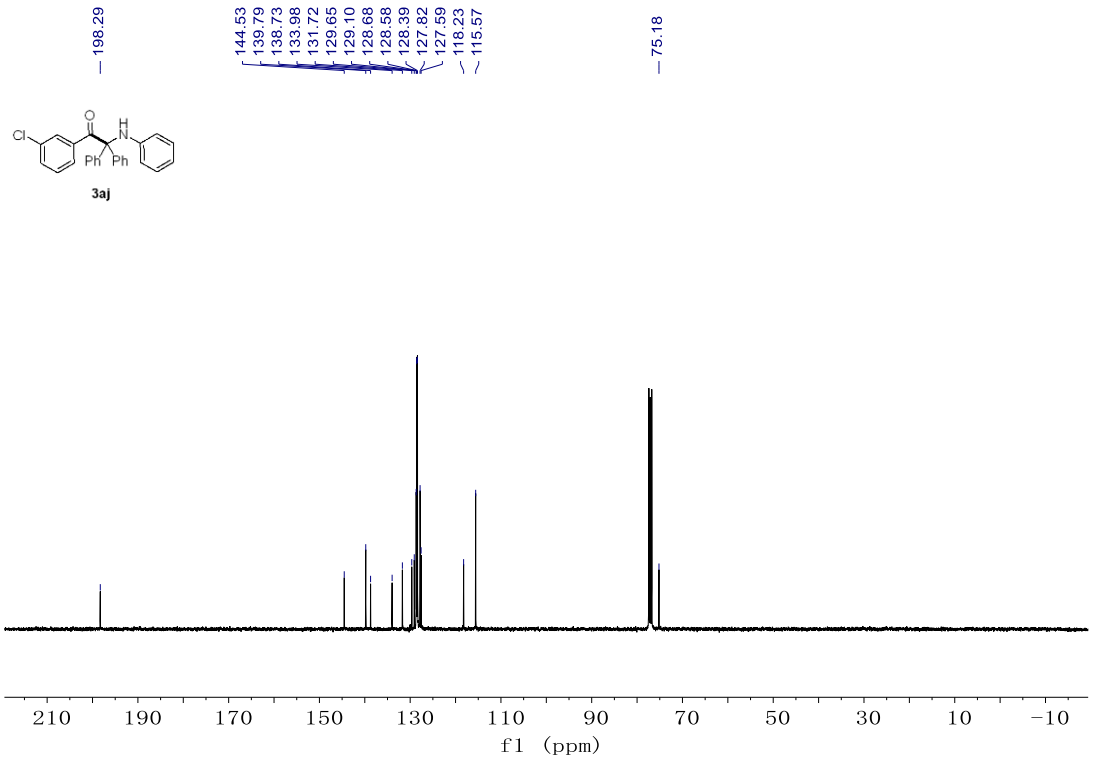
0.98
1.01
2.00
1.00
1.93
0.97
f1 (ppm)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75.18
Cl
O
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N
Ph
Ph
3aj
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70
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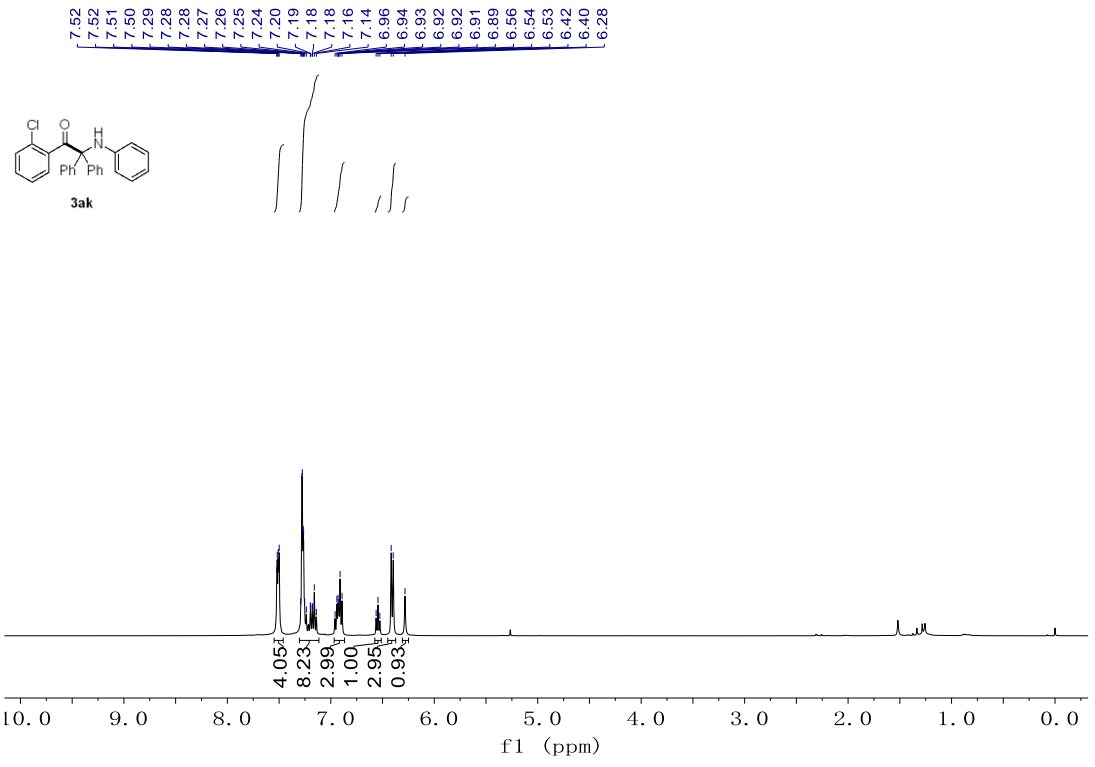
10
−10
f1 (ppm)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7.18
7.16
7.14
6.96
6.94
6.93
6.92
6.92
6.91
6.89
6.56
6.54
6.53
6.42
6.40
6.28
Cl
O
H
N
Ph
Ph
3ak
4.05
8.23
2.99
1.00
2.95
0.93
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6.0
5.0
4.0
3.0
2.0
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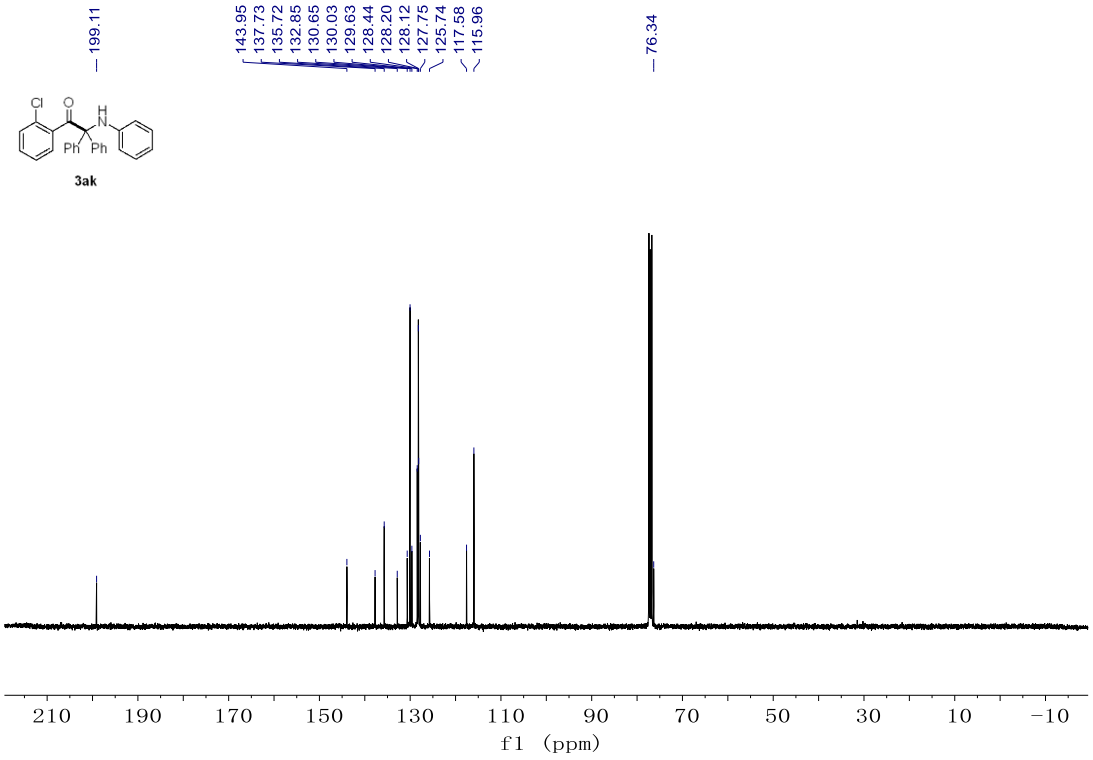
0.0
f1 (ppm)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128.12
127.75
125.74
117.58
115.96
76.34
Cl
O
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Ph
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3ak
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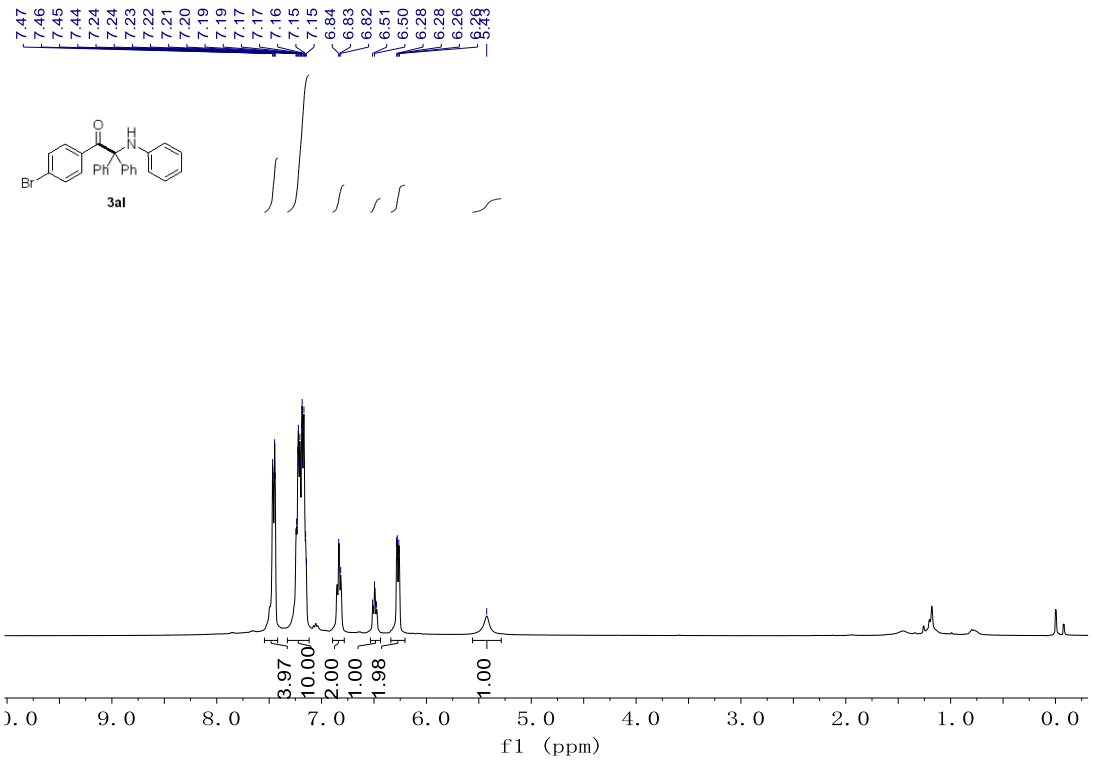
170
150
130
110
90
70
50
30
10
−10
f1 (ppm)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7.16
7.15
7.15
6.84
6.83
6.82
6.51
6.50
6.28
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6.26
6.26
5.43
O
H
N
Ph
Ph
Br
3al
3.97
10.00
2.00
1.00
1.98
1.00
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7.0
6.0
5.0
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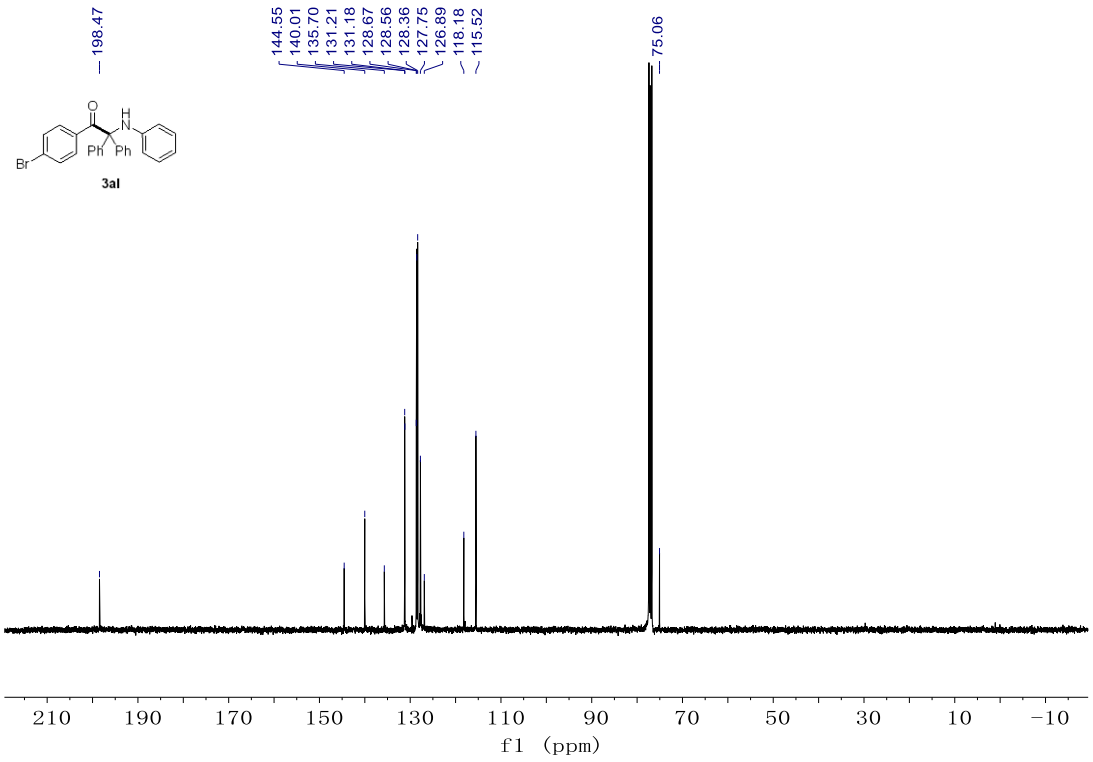
3.0
2.0
1.0
0.0
f1 (ppm)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115.52
75.06
O
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N
Ph
Ph
Br
3al
210
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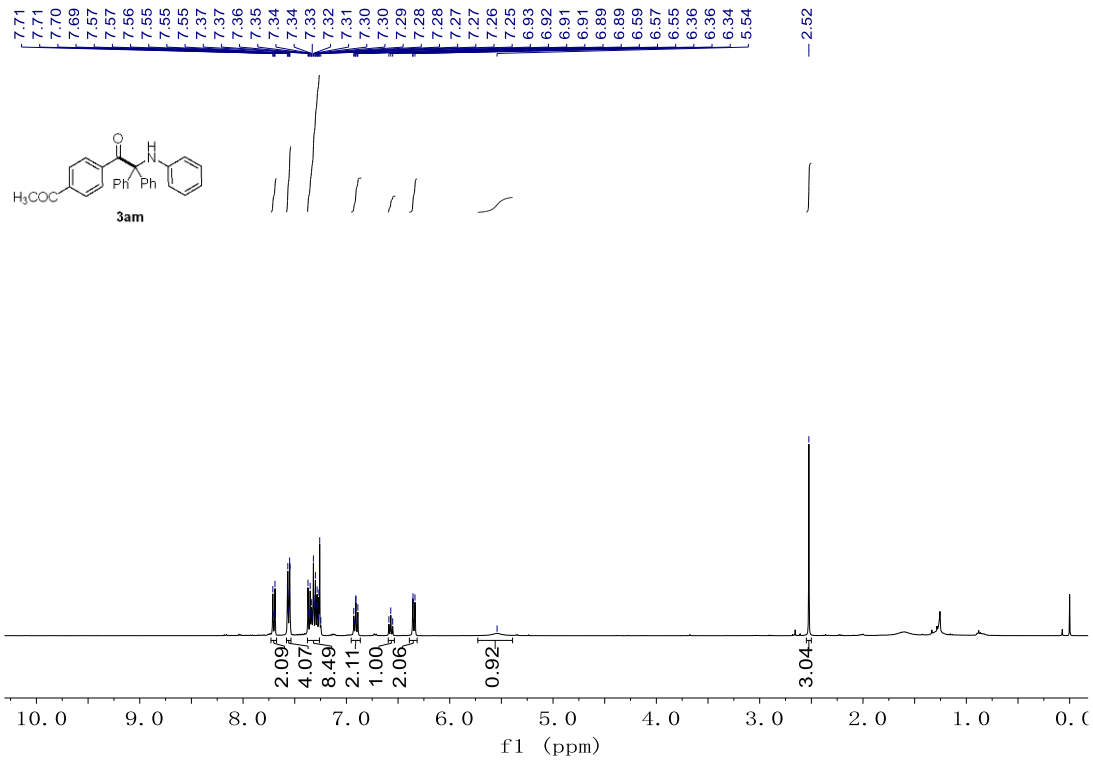
170
150
130
110
90
70
50
30
10
−10
f1 (ppm)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2.52
O
H
N
Ph
Ph
H3COC
3am
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4.07
8.49
2.11
1.00
2.06
0.92
3.04
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6.0
5.0
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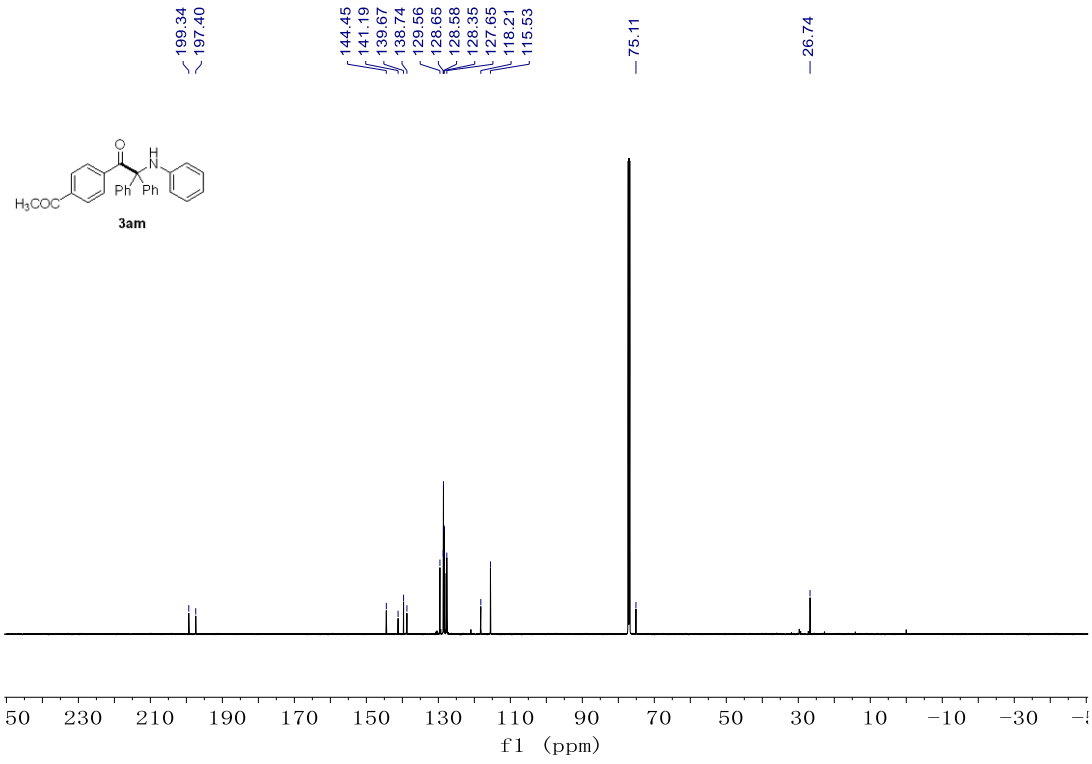
2.0
1.0
0.0
f1 (ppm)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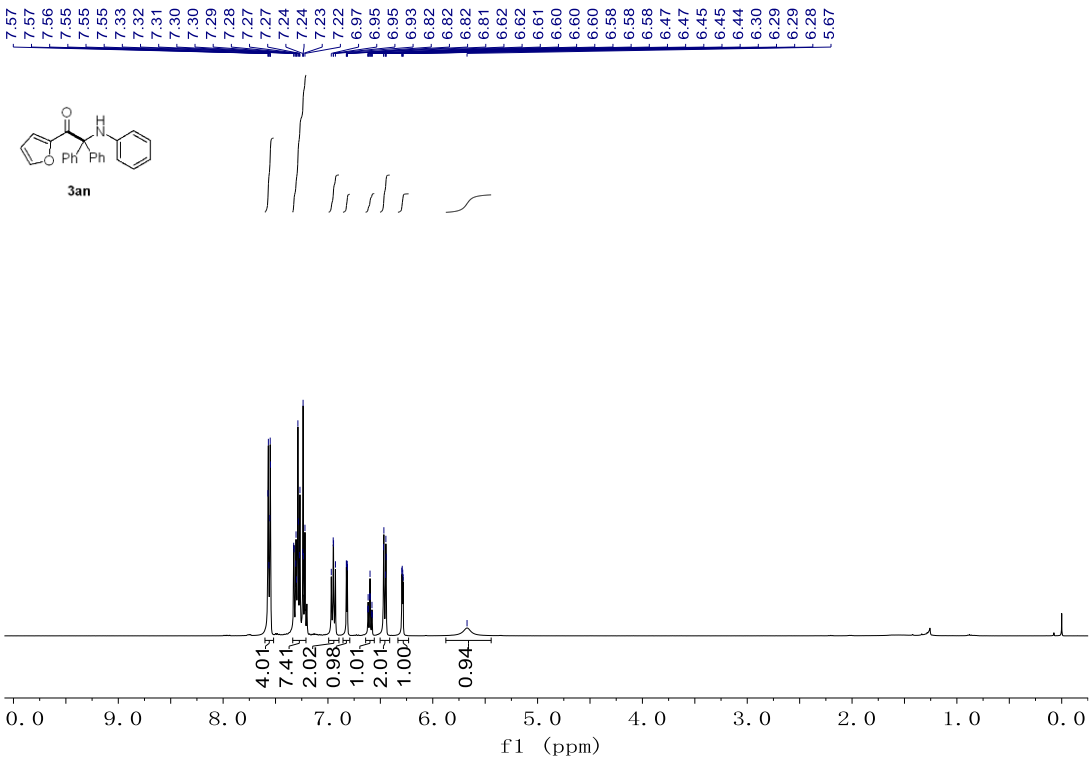
H3COC
Ph
Ph
3am
50 230 210 190 170 150 130 110 90 70 50 30 10 −10 −30
f1 (ppm)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Ph
Ph
3an
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7.41
2.02
0.98
1.01
2.01
1.00
0.94
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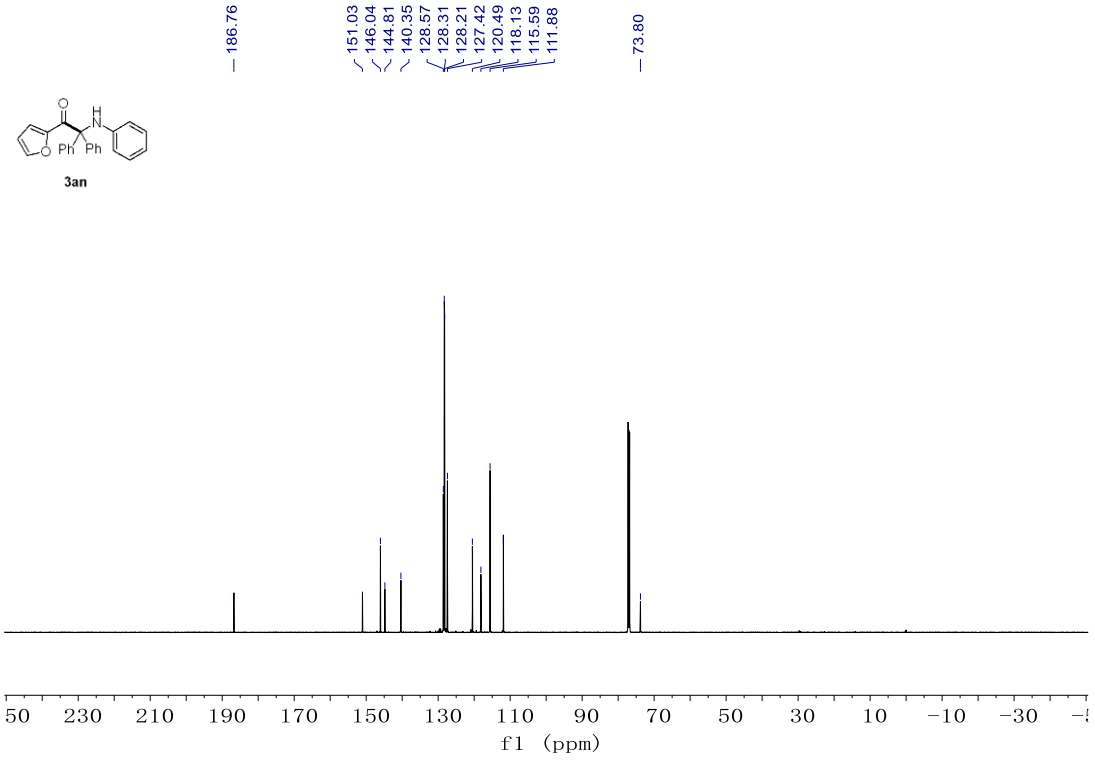
f1 (ppm)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3an
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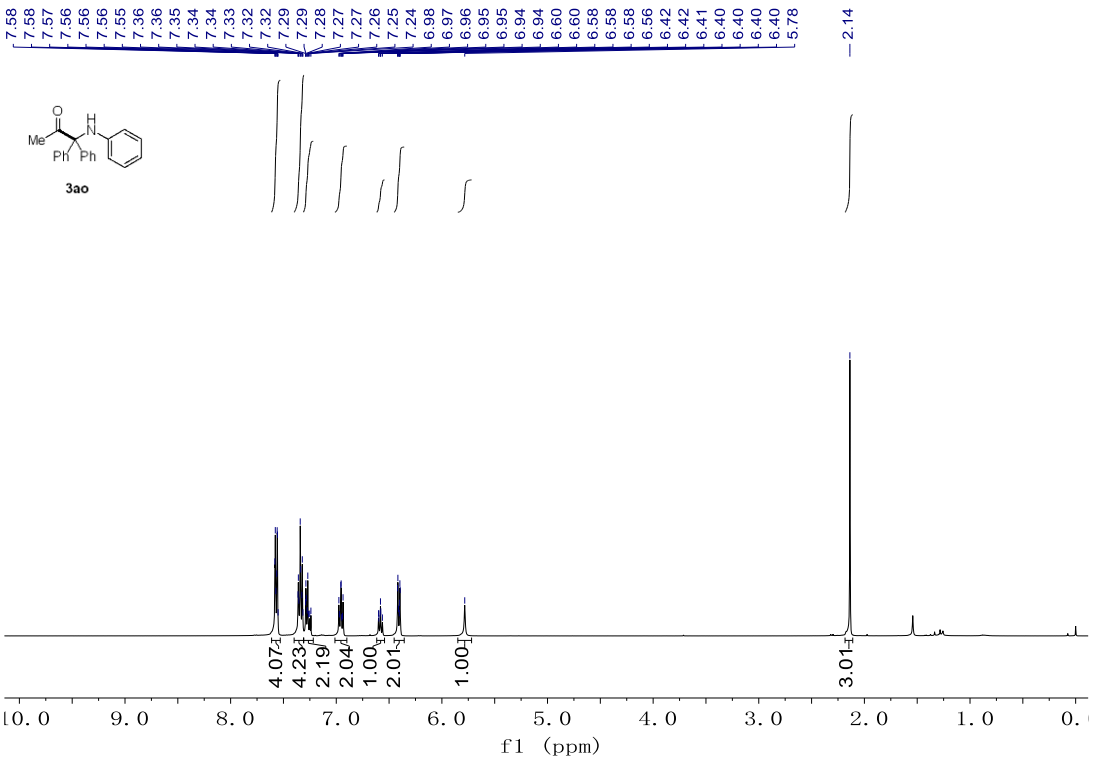
f1 (ppm)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2.19
2.04
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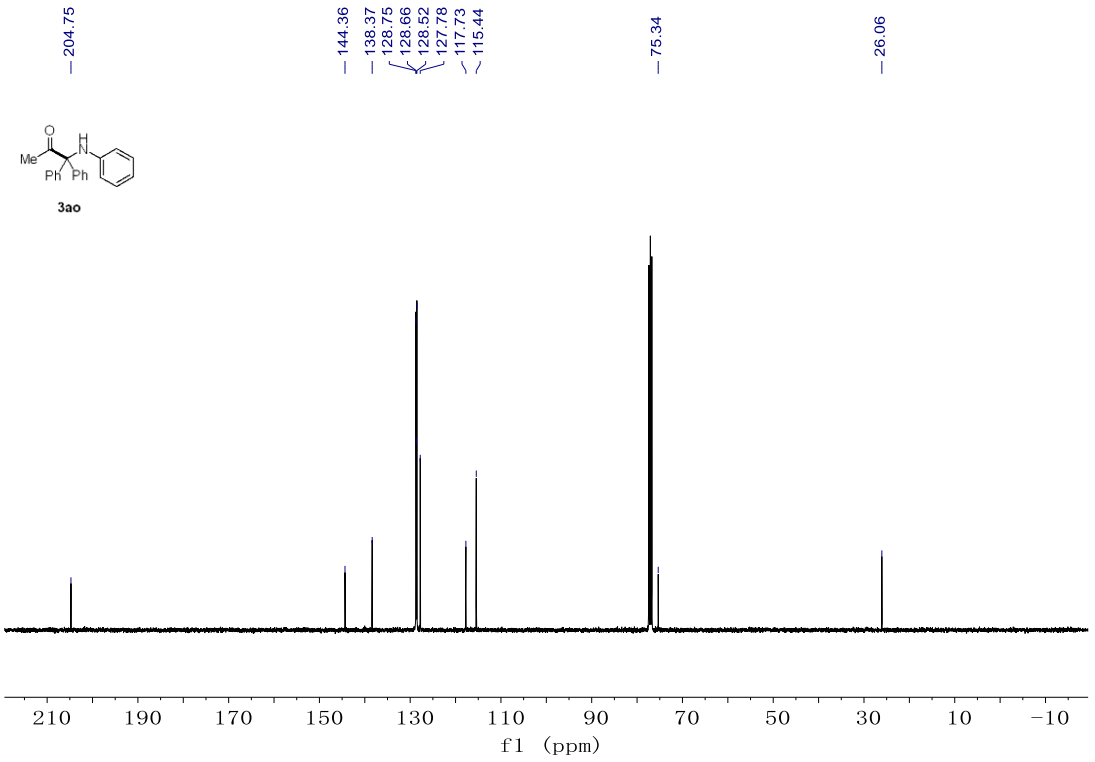
f1 (ppm)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75.34
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Me
Ph
Ph
3ao
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190
170
150
130
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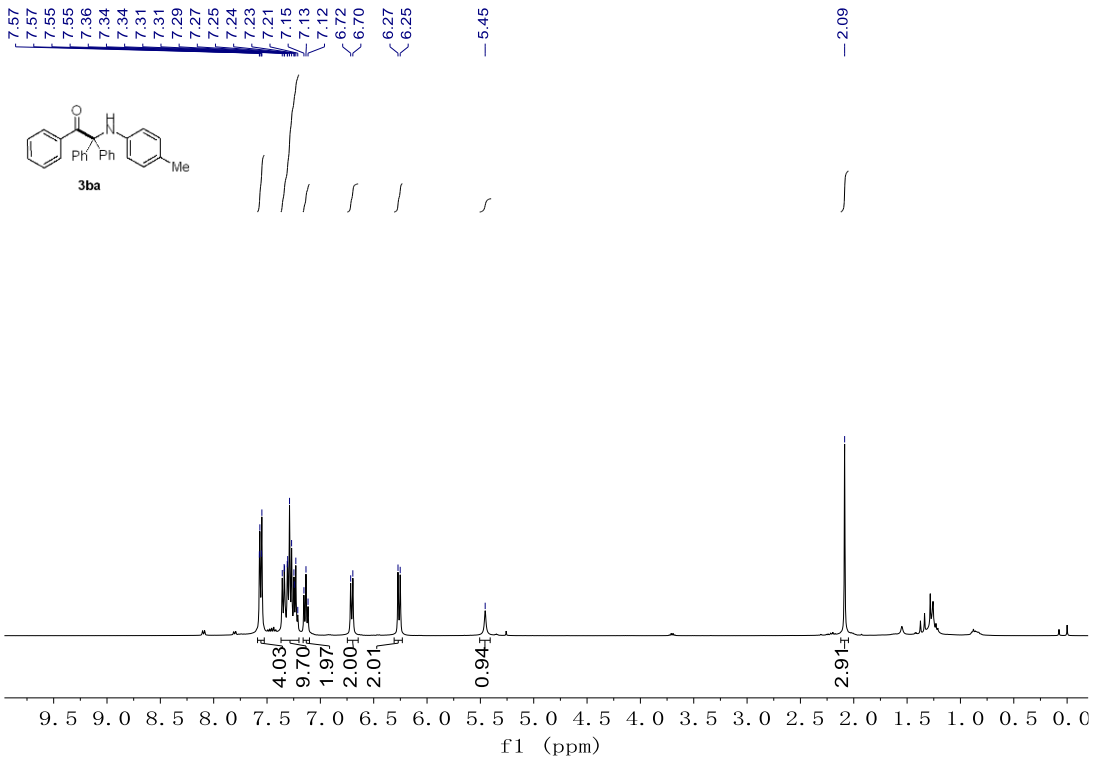
90
70
50
30
10
−10
f1 (ppm)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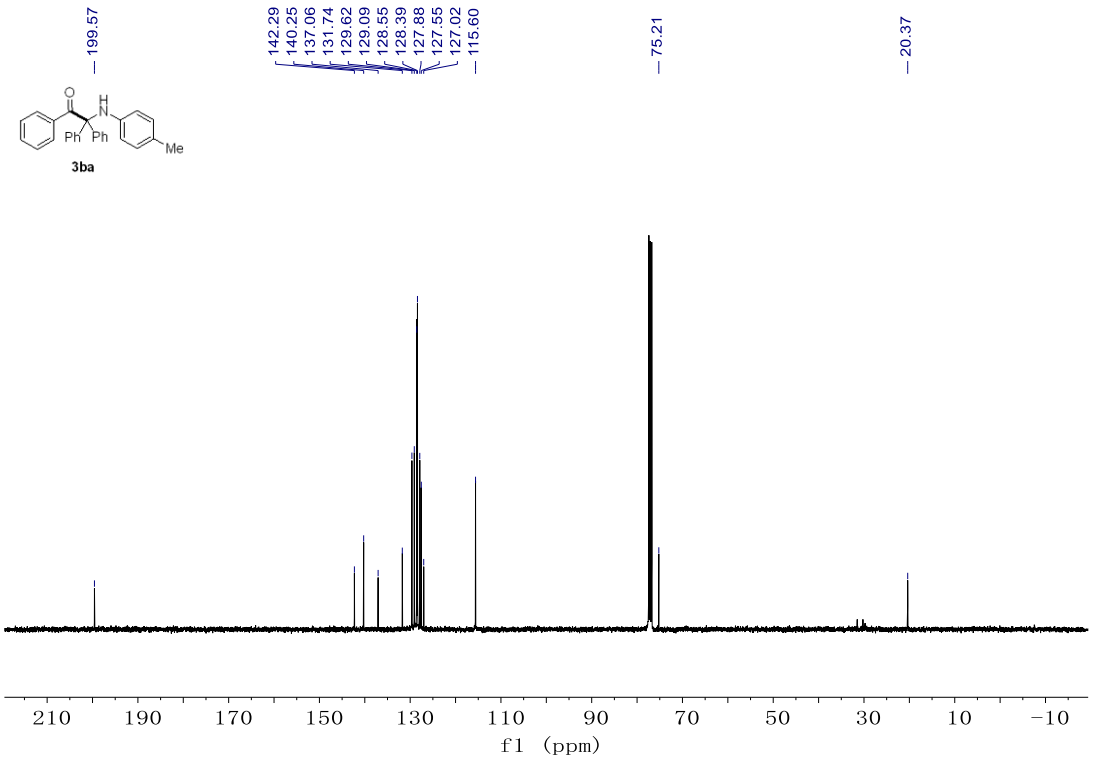
7.15
7.13
7.12
6.72
6.70
6.27
6.25
5.45
2.09
Ph
Ph
Me
3ba
4.03
9.70
1.97
2.00
2.01
0.94
2.91
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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115.60
75.21
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3ba
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170
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70
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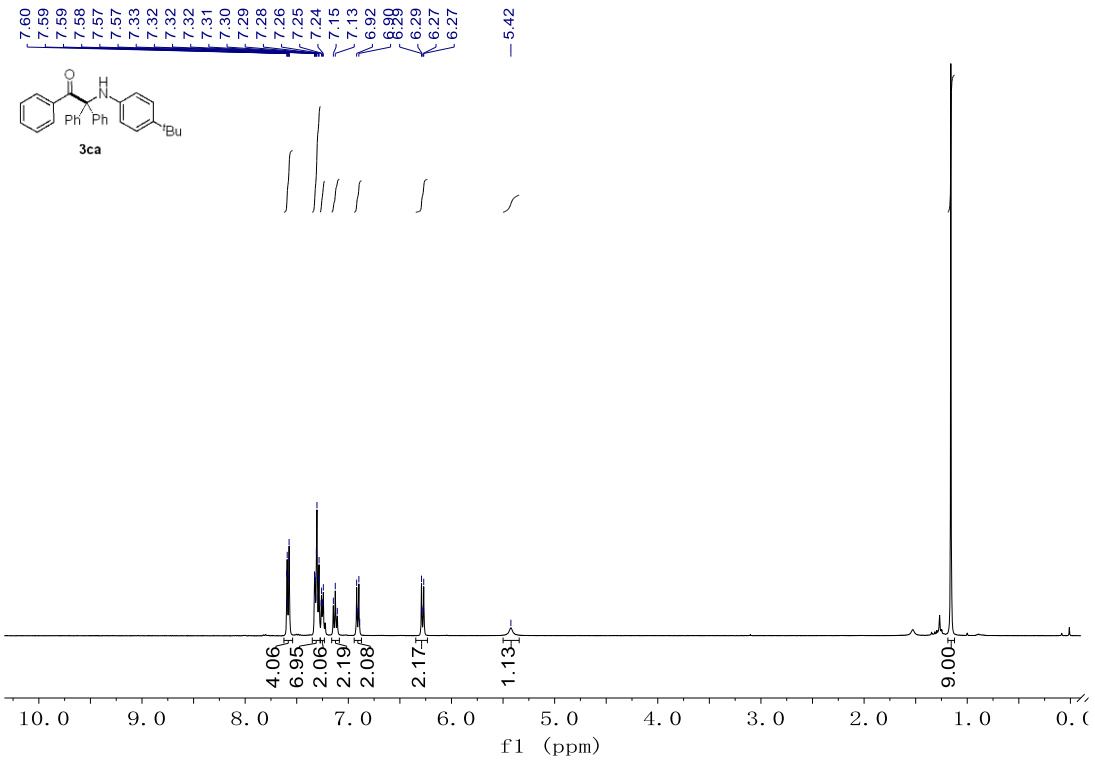
10
−10
f1 (ppm)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7.26
7.25
7.24
7.15
7.13
6.92
6.90
6.29
6.27
6.27
5.42
Ph
Ph
tBu
3ca
4.06
6.95
2.06
2.19
2.08
2.17
1.13
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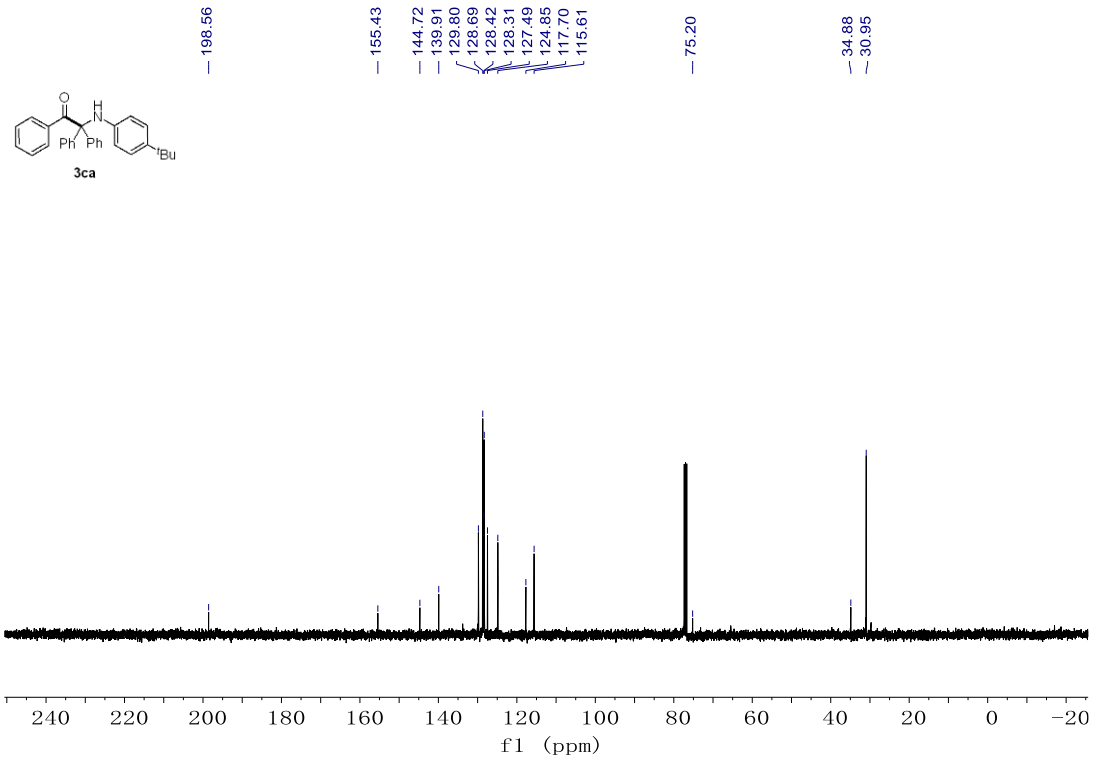
1.0
f1 (ppm)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124.85
117.70
115.61
75.20
34.88
30.95
Ph
Ph
H
N
tBu
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80
60
40
20
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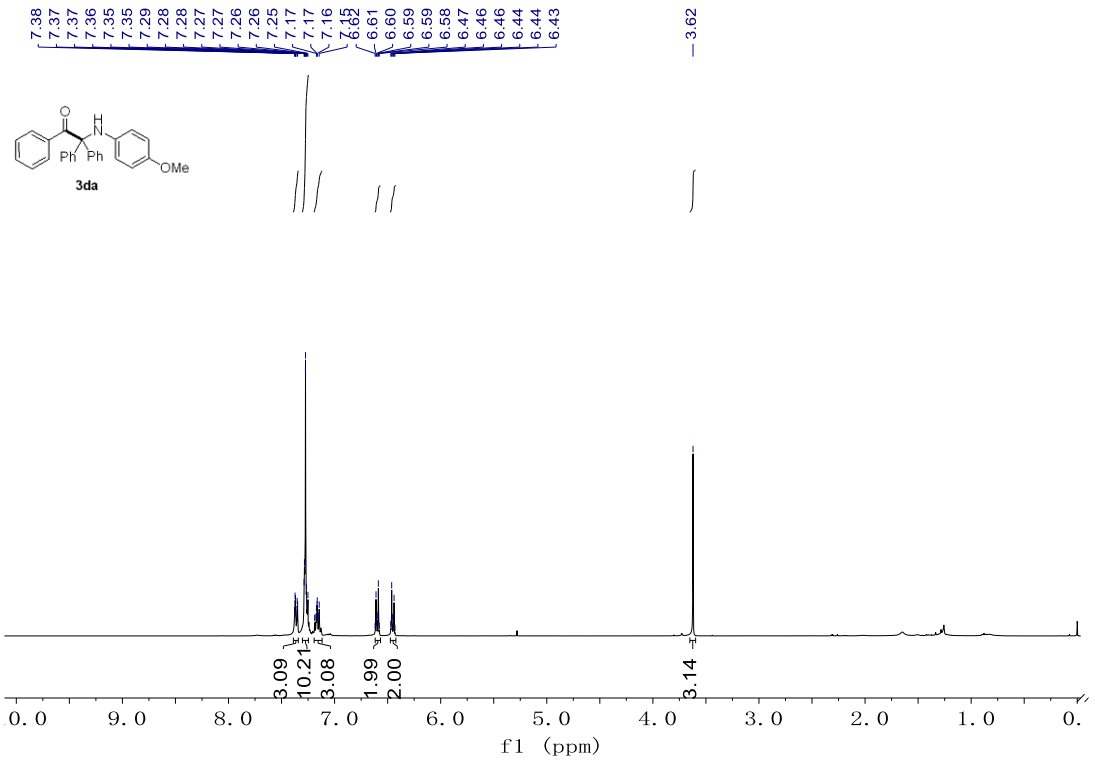
−20
f1 (ppm)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6.43
3.62
Ph
Ph
H
N
OMe
3da
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10.21
3.08
1.99
2.00
3.14
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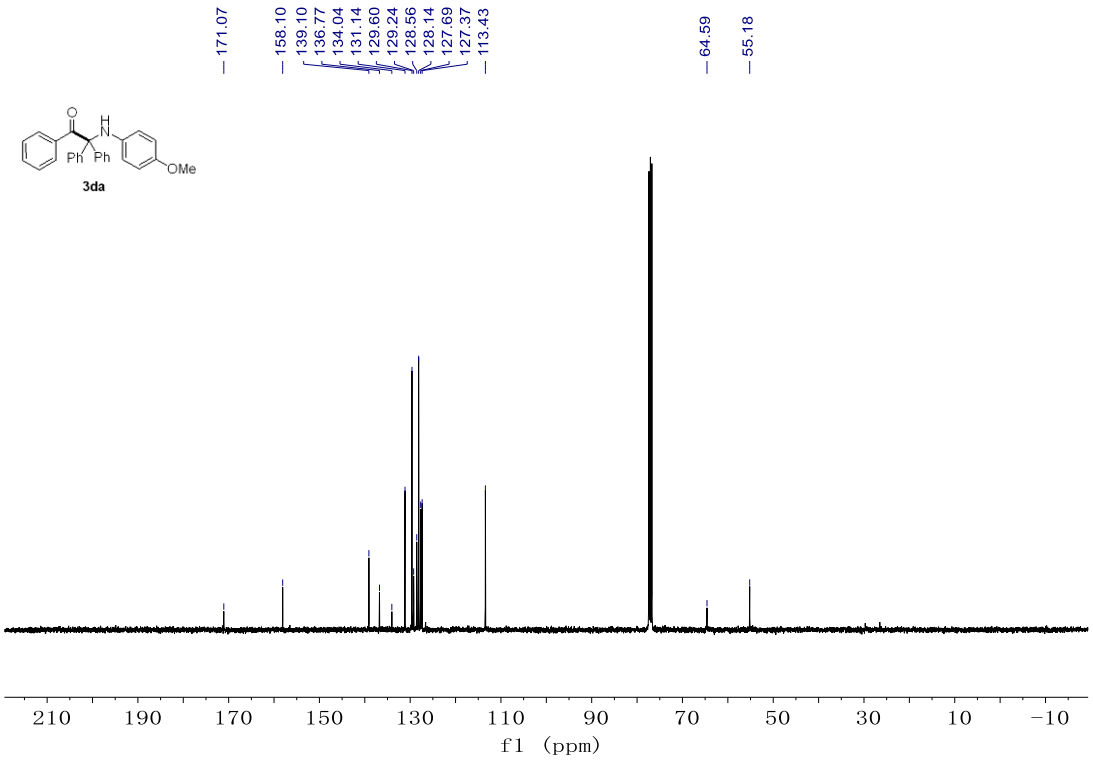
f1 (ppm)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64.59
55.18
O
H
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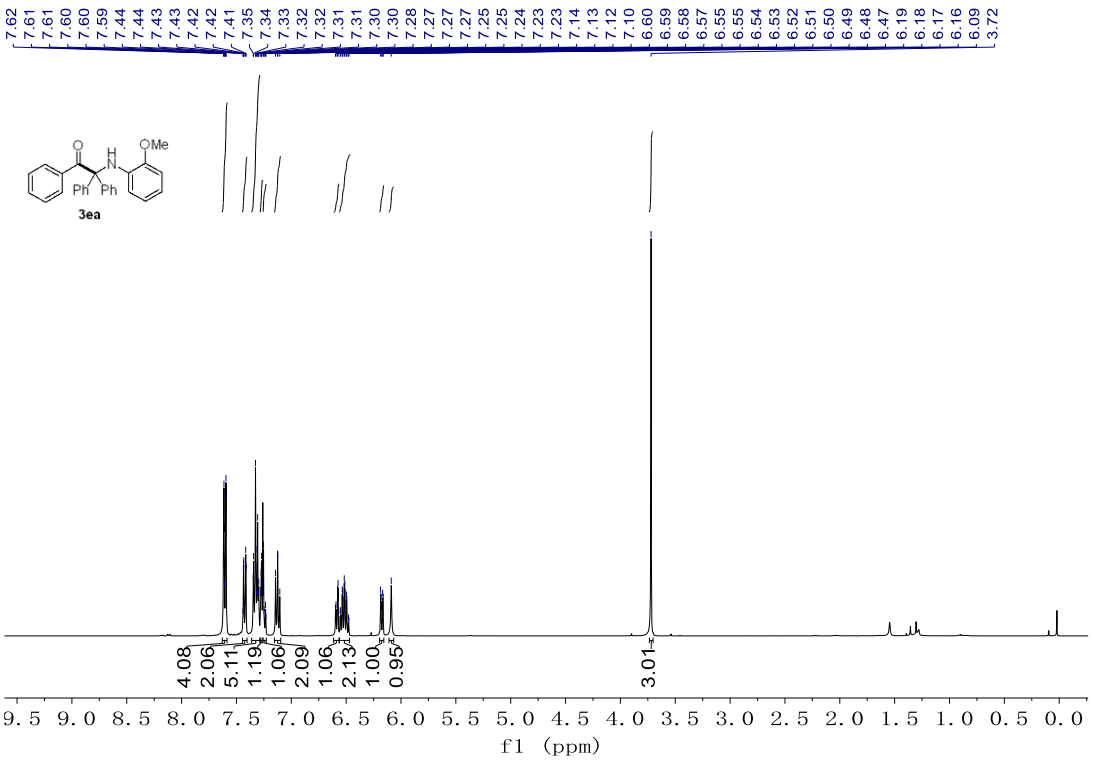
10
−10
f1 (ppm)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7.44
7.44
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7.41
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7.23
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7.13
7.12
7.10
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6.59
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6.57
6.55
6.55
6.54
6.53
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6.51
6.50
6.49
6.48
6.47
6.19
6.18
6.17
6.16
6.09
3.72
O
H
N
OMe
Ph
Ph
3ea
4.08
2.06
5.11
1.19
1.06
2.09
1.06
2.13
1.00
0.95
3.01
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
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2.5
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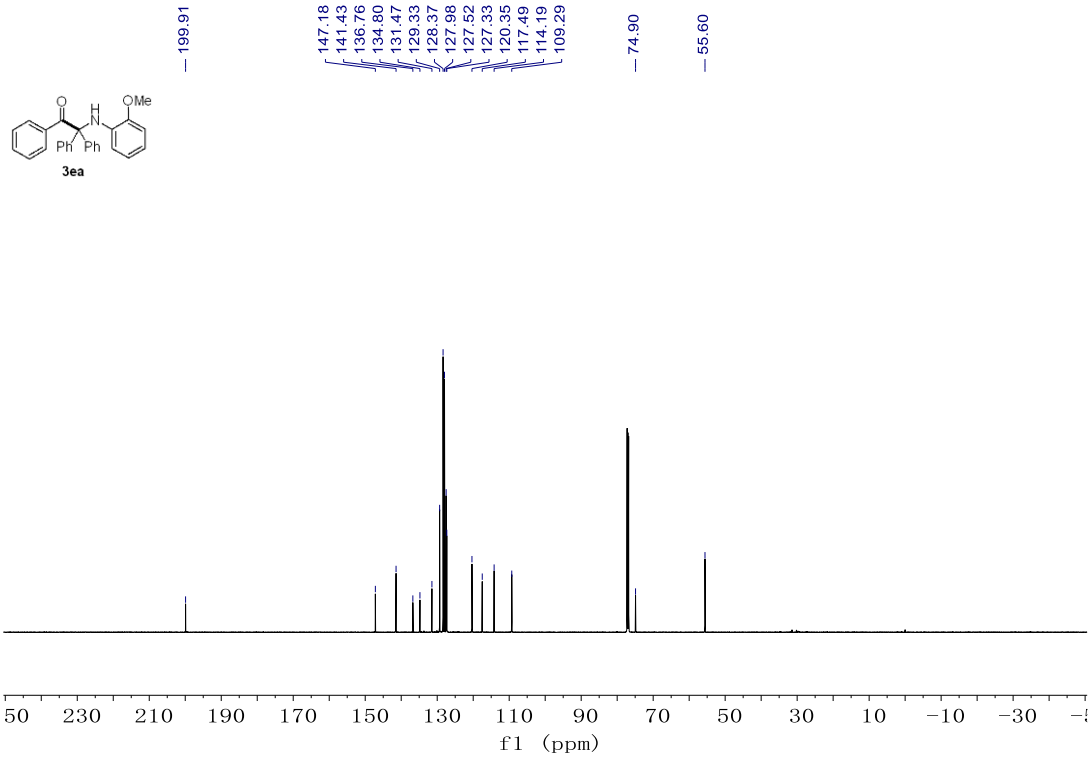
1.5
1.0
0.5
0.0
f1 (ppm)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127.52
127.33
120.35
117.49
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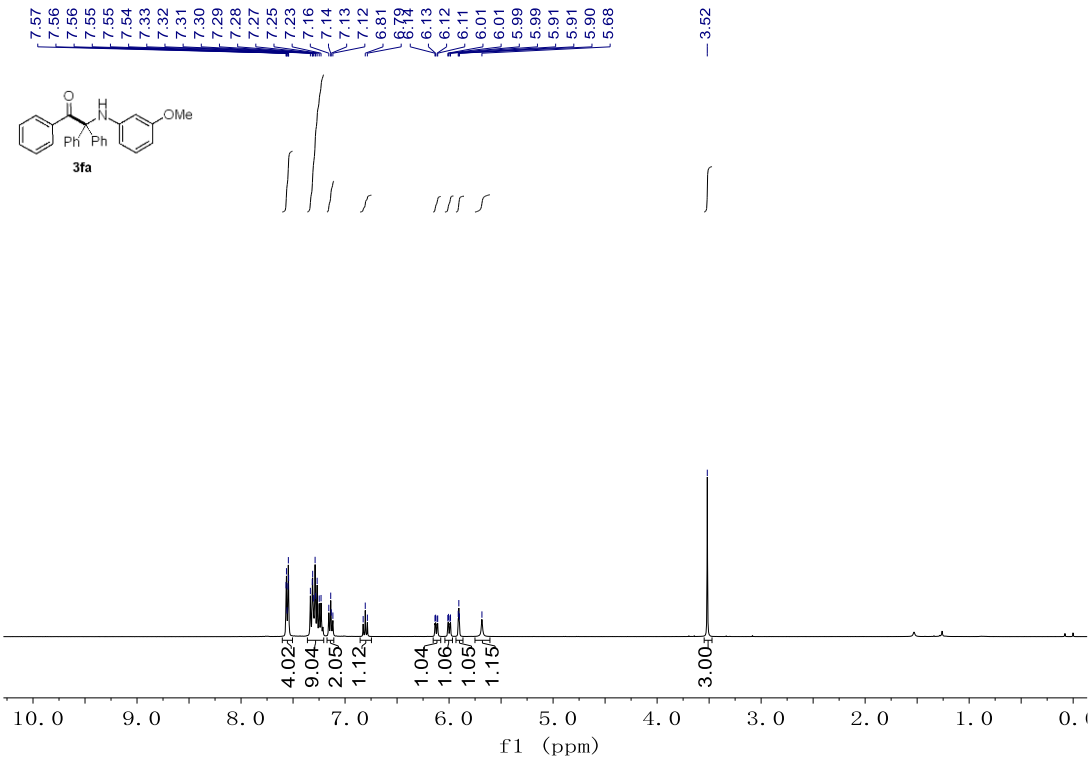
74.90
55.60
OMe
Ph
Ph
3ea
50 230 210 190 170 150 130 110 90 70 50 30 10 −10 −30
f1 (ppm)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7.23
7.16
7.14
7.13
7.12
6.81
6.79
6.14
6.13
6.12
6.11
6.01
6.01
5.99
5.99
5.91
5.91
5.90
5.68
3.52
OMe
Ph
Ph
3fa
4.02
9.04
2.05
1.12
1.04
1.06
1.05
1.15
3.00
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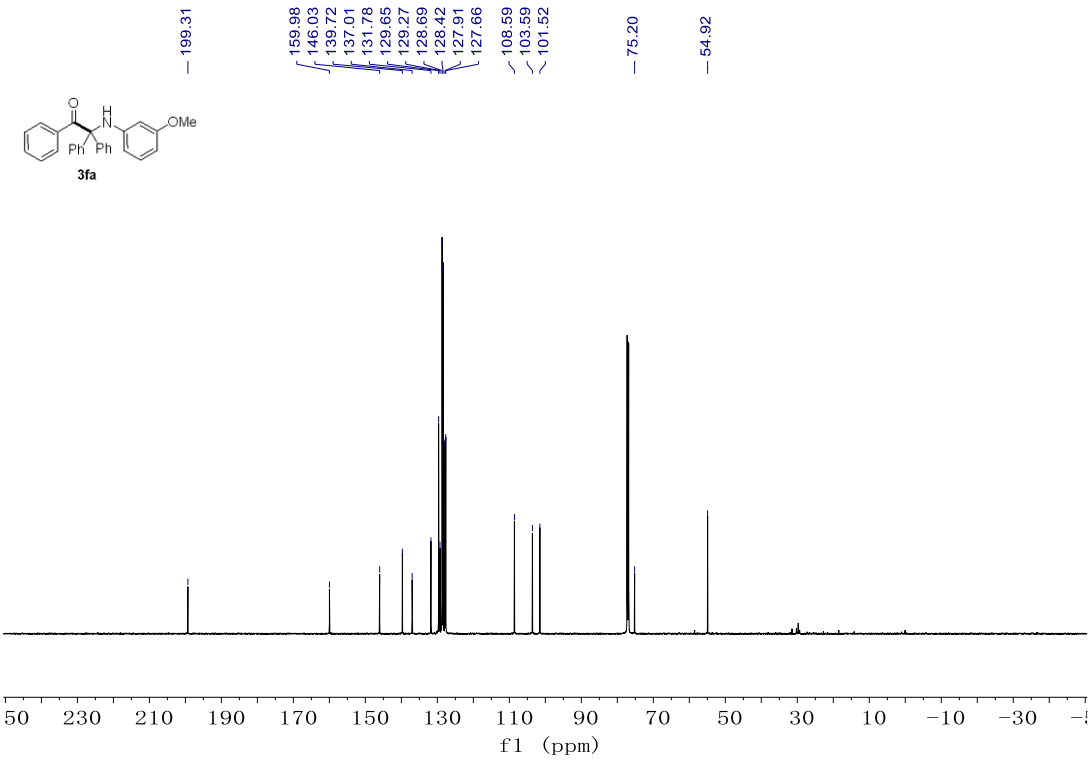
f1 (ppm)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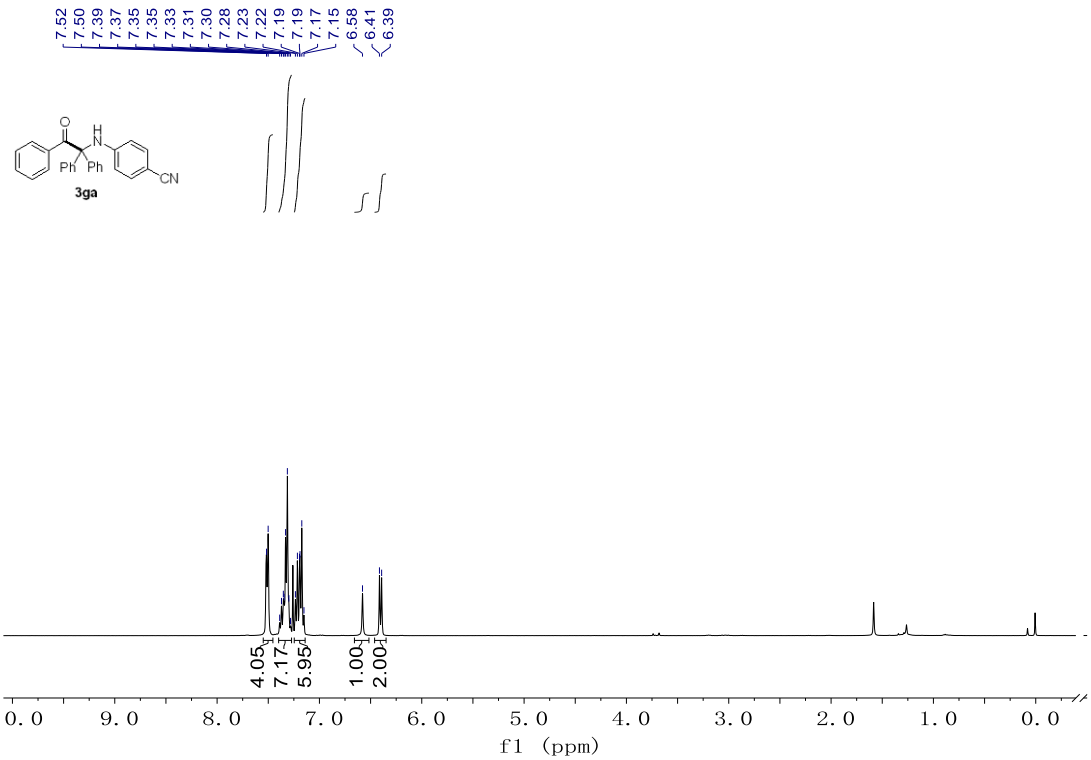
127.66
108.59
103.59
101.52
75.20
54.92
OMe
Ph
Ph
3fa
50 230 210 190 170 150 130 110 90 70 50 30 10 −10 −30
f1 (ppm)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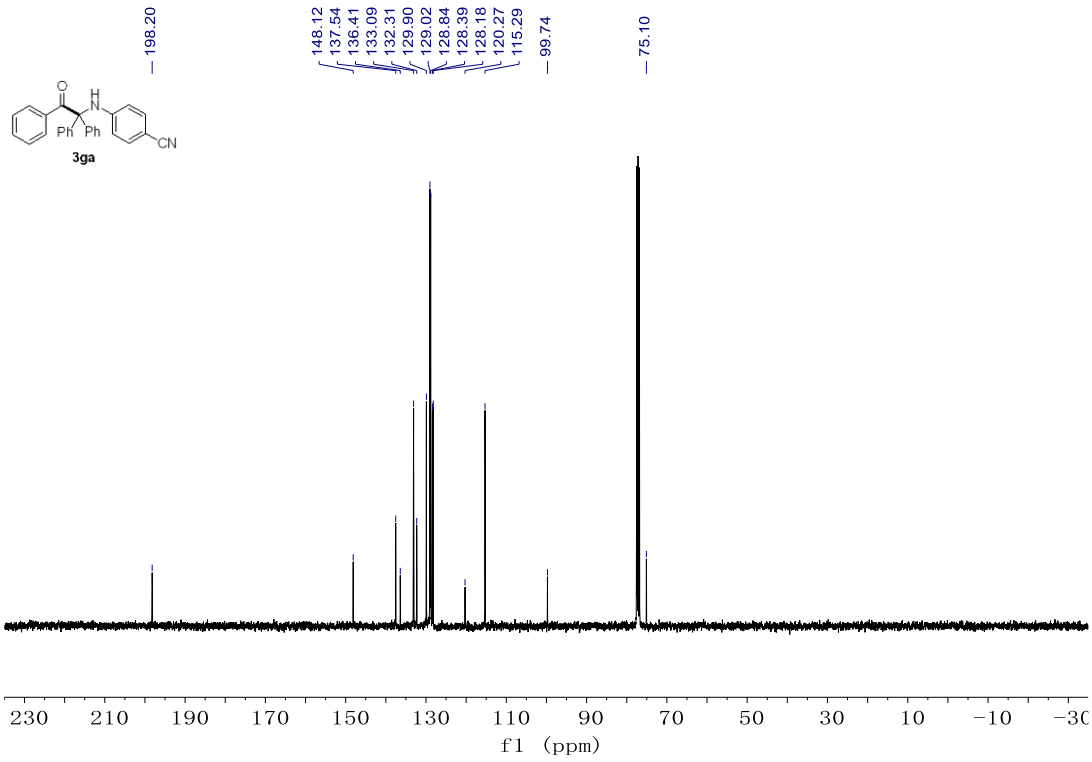
7.22
7.19
7.19
7.17
7.15
6.58
6.41
6.39
Ph
Ph
CN
3ga
4.05
7.17
5.95
1.00
2.00
0.0 9.0 8.0 7.0 6.0 5.0 4.0 3.0 2.0 1.0 0.0
f1 (ppm)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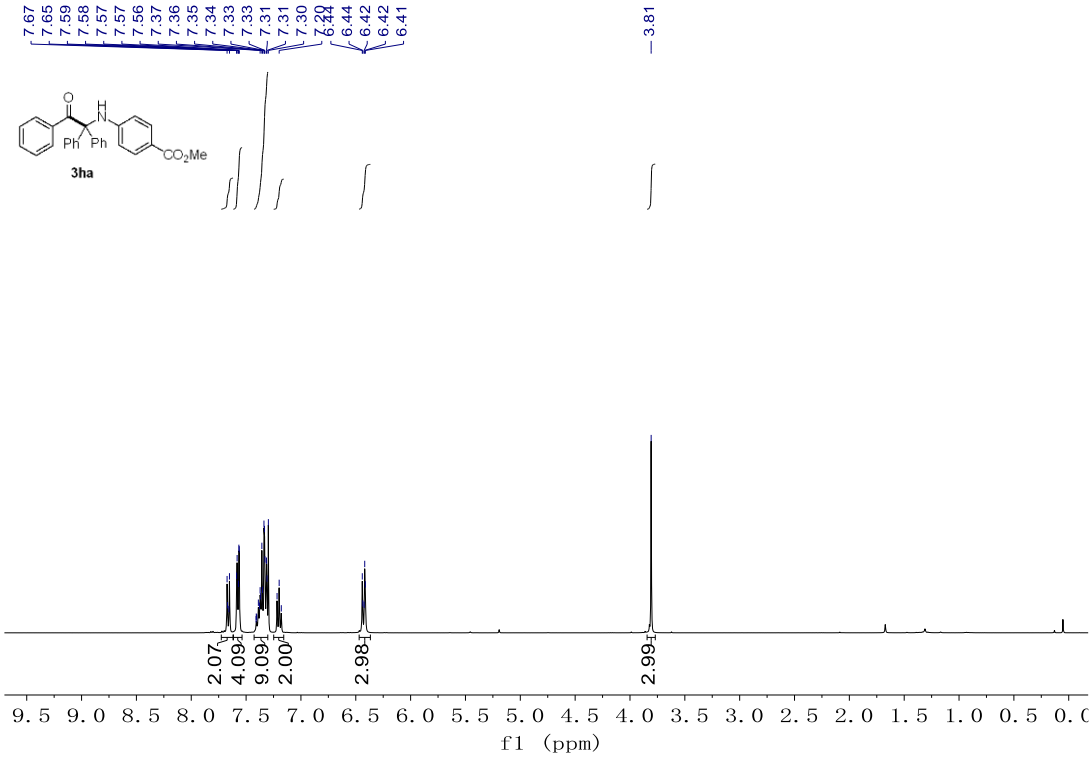
120.27
115.29
99.74
75.10
3ga
f1 (ppm)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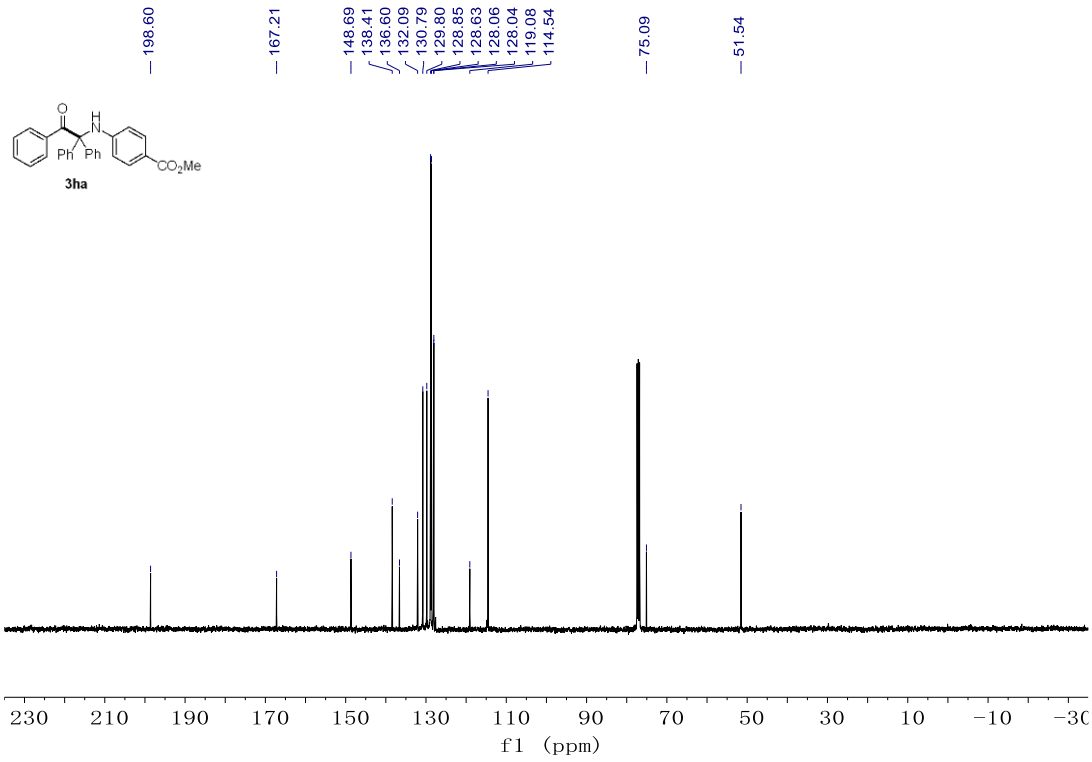
7.35
7.34
7.33
7.33
7.31
7.31
7.30
7.20
6.44
6.42
6.42
6.41
3.81
3ha
2.07
4.09
9.09
2.00
2.98
2.99
f1 (ppm)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129.80
128.85
128.63
128.06
128.04
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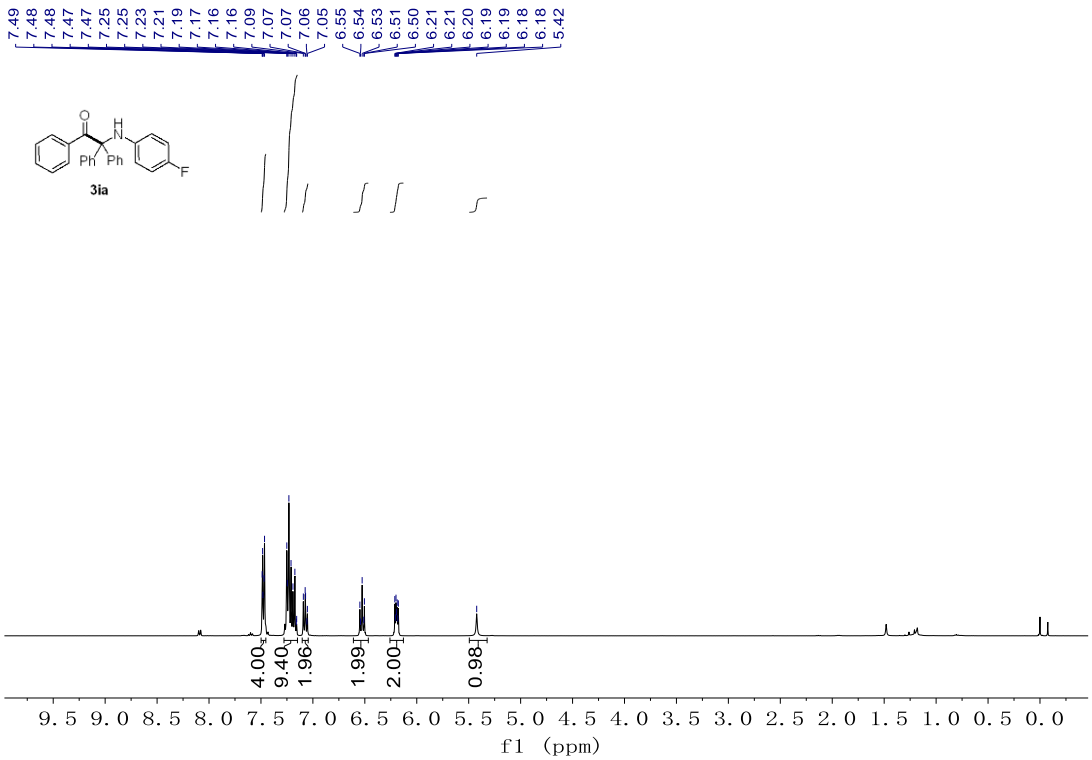
114.54
75.09
51.54
Ph
Ph
CO2Me
3ha
230 210 190 170 150 130 110 90 70 50 30 10 −10 −30
f1 (ppm)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7.17
7.16
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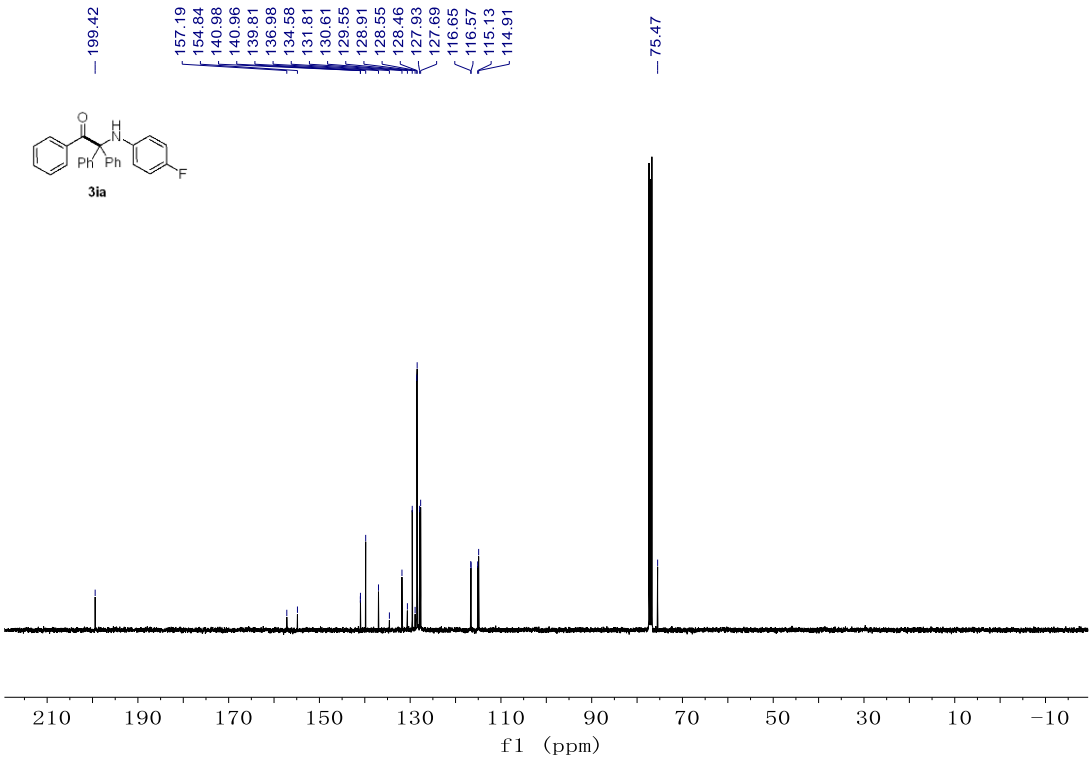
7.09
7.07
7.07
7.06
7.05
6.55
6.54
6.53
6.51
6.50
6.21
6.21
6.20
6.19
6.19
6.18
6.18
5.42
Ph
Ph
F
3ia
4.00
9.40
1.96
1.99
2.00
0.98
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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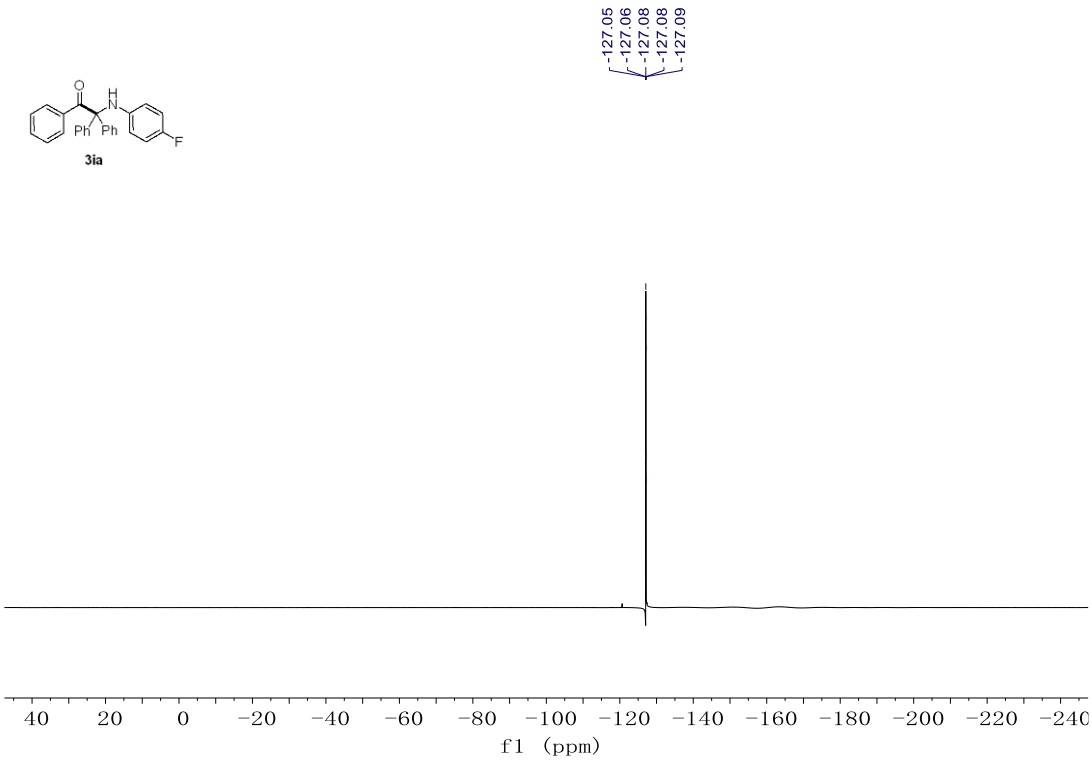
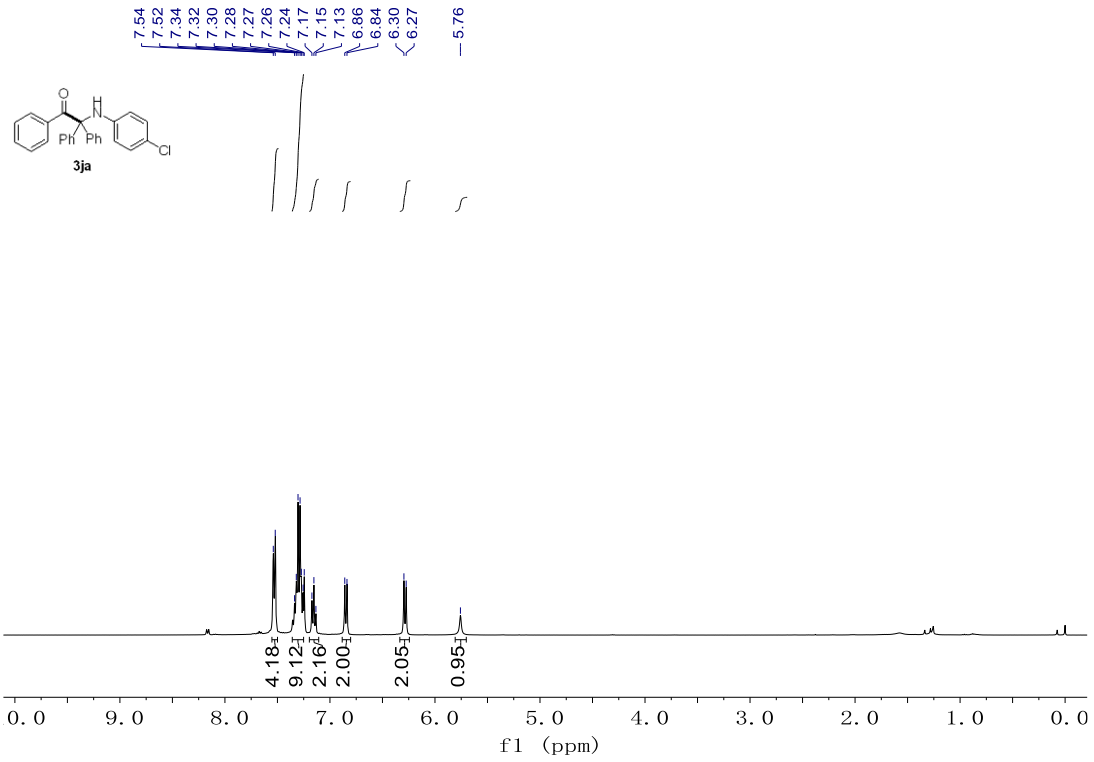
140.96
139.81
136.98
134.58
131.81
130.61
129.55
128.91
128.55
128.46
127.93
127.69
116.65
116.57
115.13
114.91
75.47
O
H
N
Ph
Ph
F
3ia
210
190
170
150
130
110
90
70
50
30
10
−10
f1 (ppm)


-127.05
-127.06
-127.08
-127.08
-127.09
O
H
N
Ph
Ph
F
3ia
40
20
0
−20
−40
−60
−80
−100
−120
−140
−160
−180
−200
−220
−240
f1 (ppm)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7.27
7.26
7.24
7.17
7.15
7.13
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6.30
6.27
5.76
O
H
N
Ph
Ph
Cl
3ja
4.18
9.12
2.16
2.00
2.05
0.95
0.0
9.0
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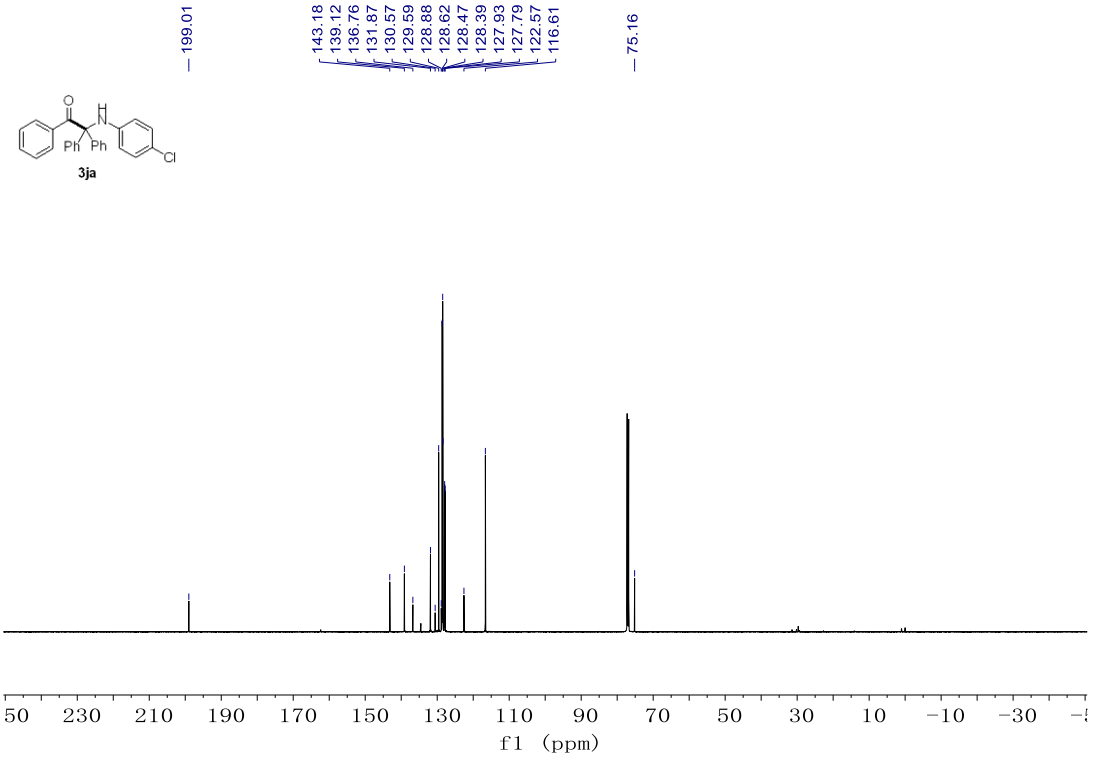
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
f1 (ppm)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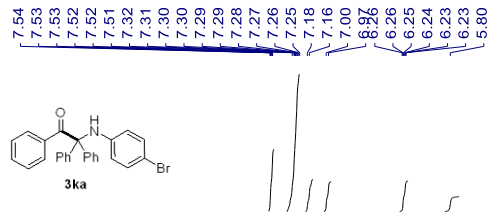
128.47
128.39
127.93
127.79
122.57
116.61
75.16
O
H
N
Ph
Ph
Cl
3ja
50
230
210
190
170
150
130
110
90
70
50
30
10
−10
−30
f1 (ppm)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7.30
7.29
7.29
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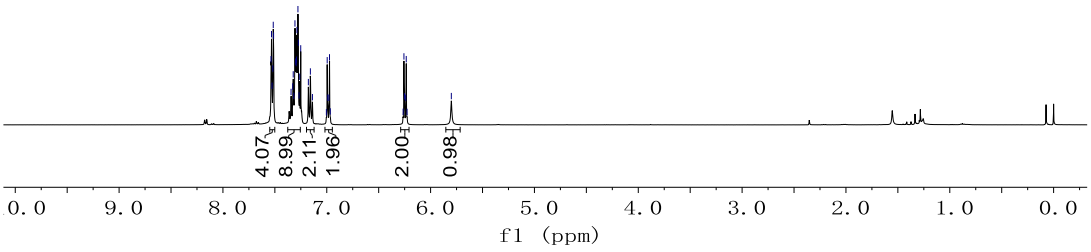
7.26
7.25
7.18
7.16
7.00
6.26
6.25
6.24
6.23
5.80
O
H
N
Ph
Ph
Br
3ka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2.00
0.98
0.0
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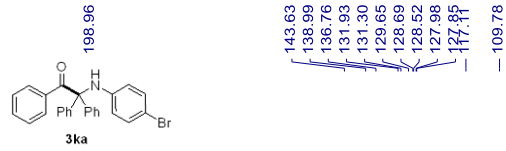
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
f1 (ppm)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O
H
N
Ph
Ph
Br
3ka


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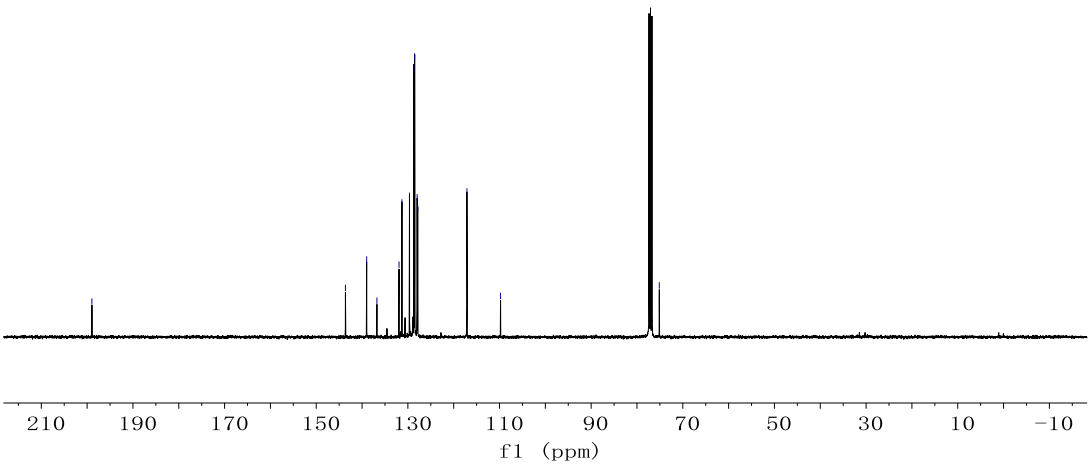
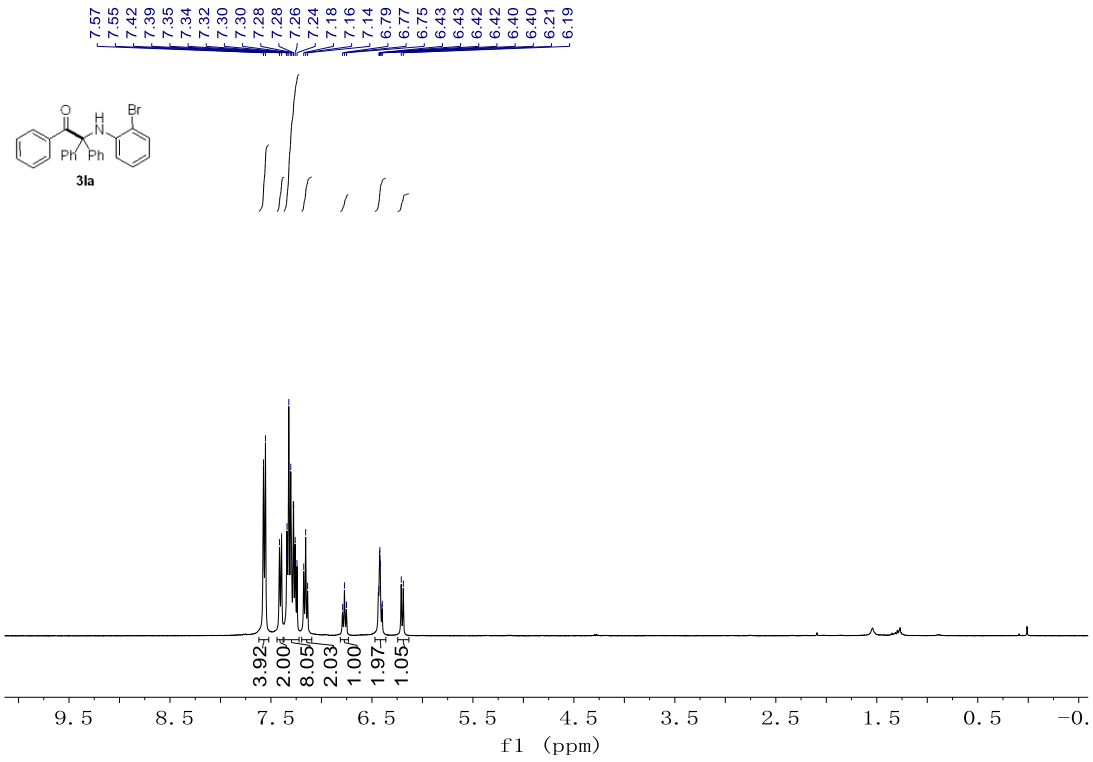
128.52
127.98
117.11
109.78
75.13


210
190
170
150
130
110
90
70
50
30
10
−10
f1 (ppm)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7.14
6.79
6.77
6.75
6.43
6.43
6.42
6.42
6.40
6.40
6.21
6.19
O
H
N
Br
Ph
Ph
3la
3.92
2.00
8.05
2.03
1.00
1.97
1.05
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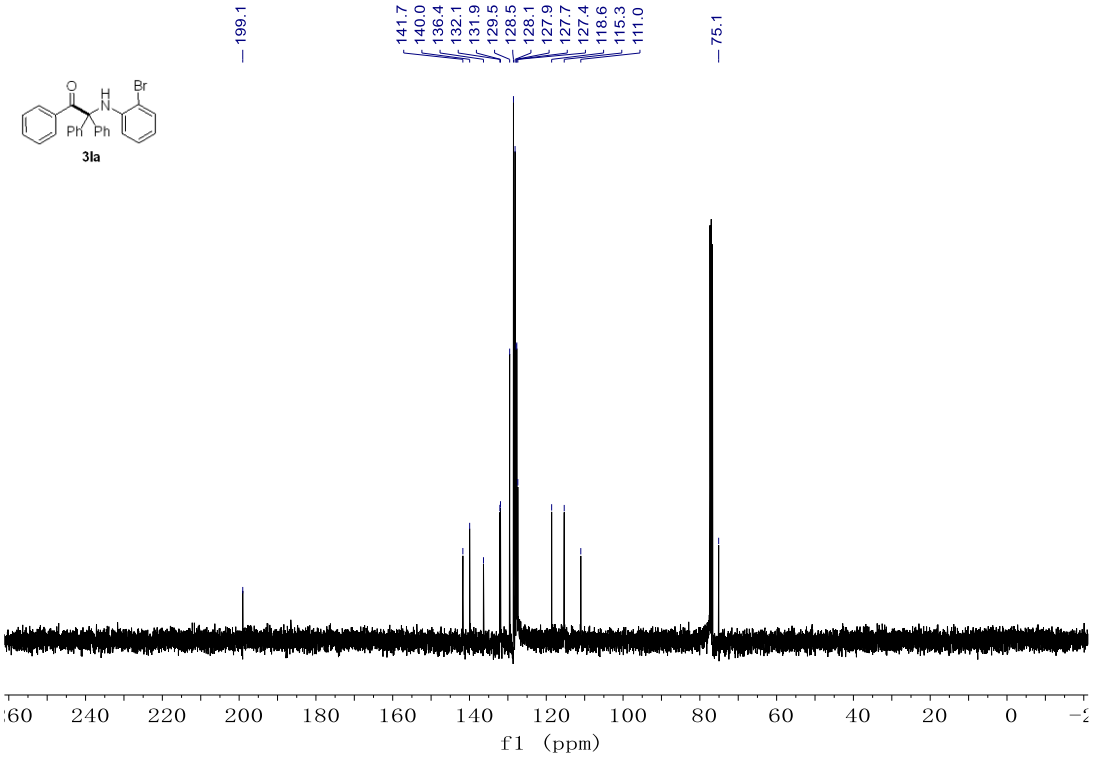
7.5
6.5
5.5
4.5
3.5
2.5
1.5
0.5
f1 (ppm)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127.9
127.7
127.4
118.6
115.3
111.0
75.1
O
H
N
Br
Ph
Ph
3la
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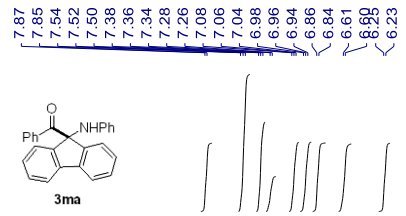
220
200
180
160
140
120
100
80
60
40
20
0
f1 (ppm)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7.36
7.34
7.28
7.26
7.08
7.06
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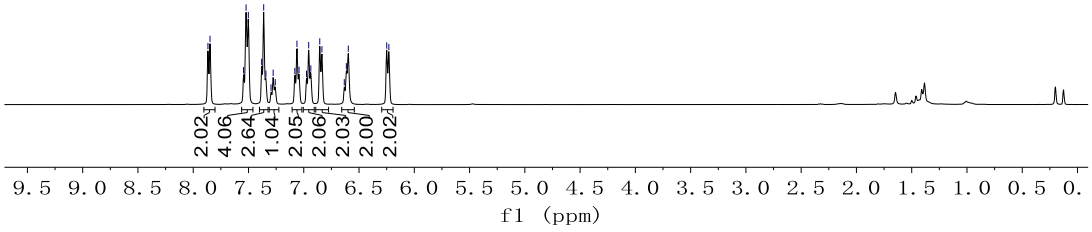
6.94
6.86
6.84
6.61
6.60
6.23
O
Ph
NHPh
3ma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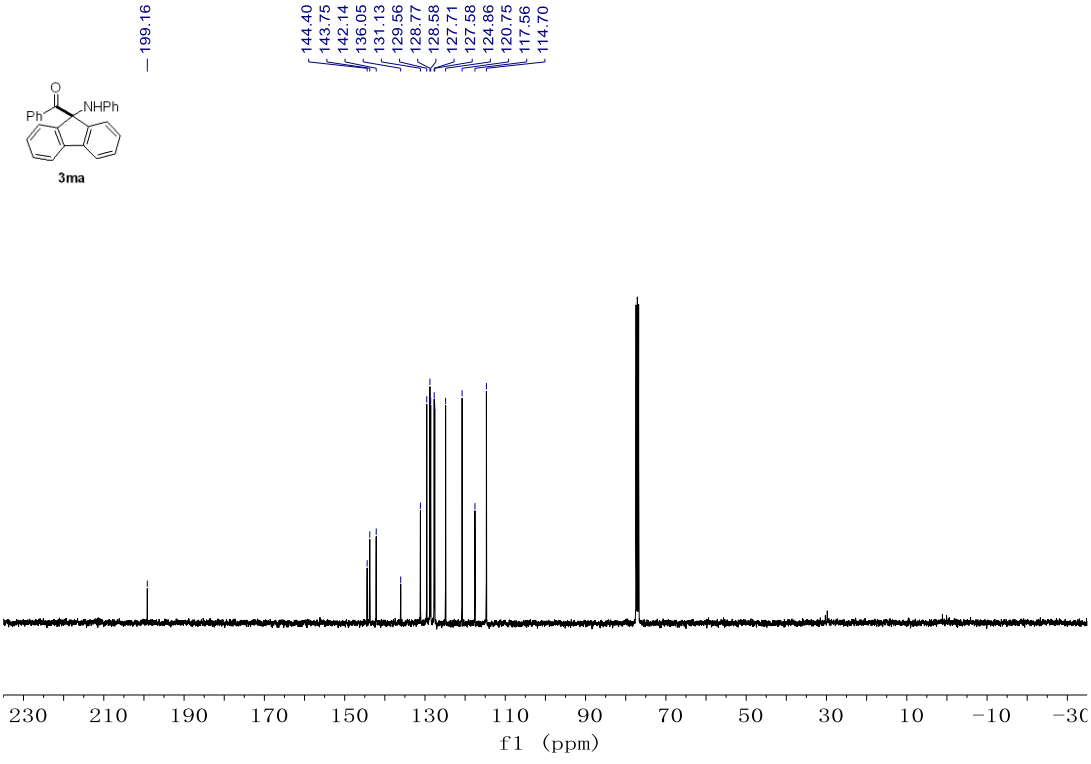
4.06
2.64
1.04
2.05
2.06
2.03
2.00
2.02
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)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127.58
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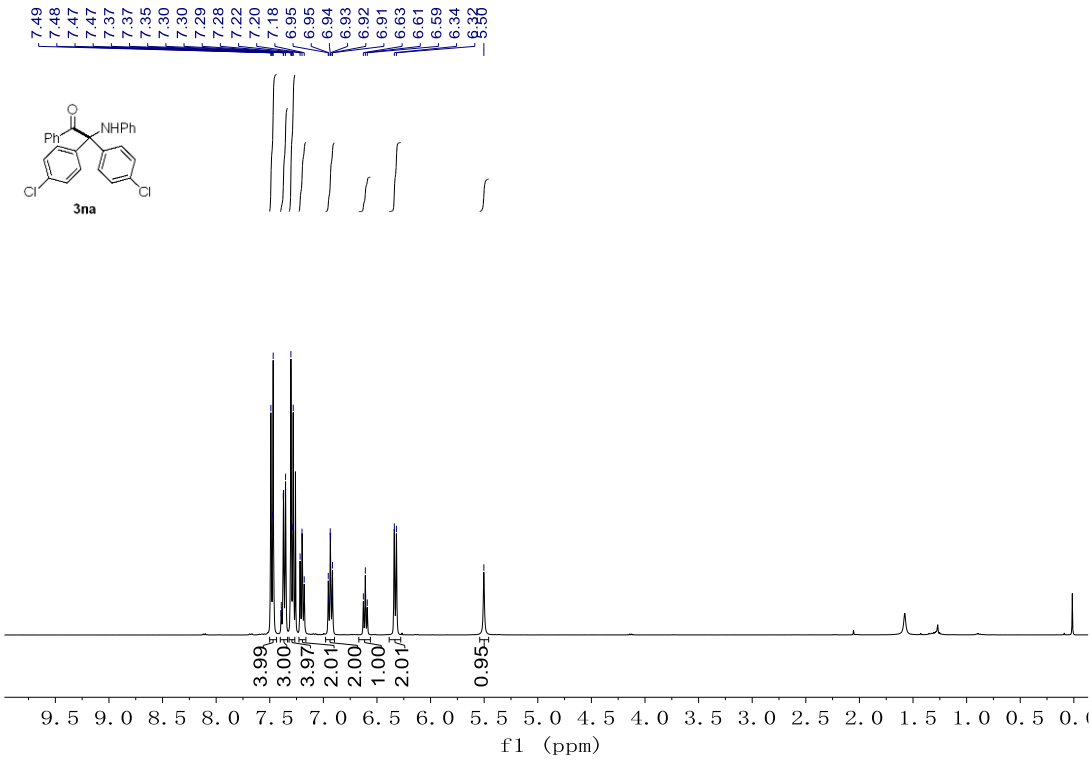
117.56
114.70
O
Ph
NHPh
3ma
230 210 190 170 150 130 110 90 70 50 30 10 −10 −30
f1 (ppm)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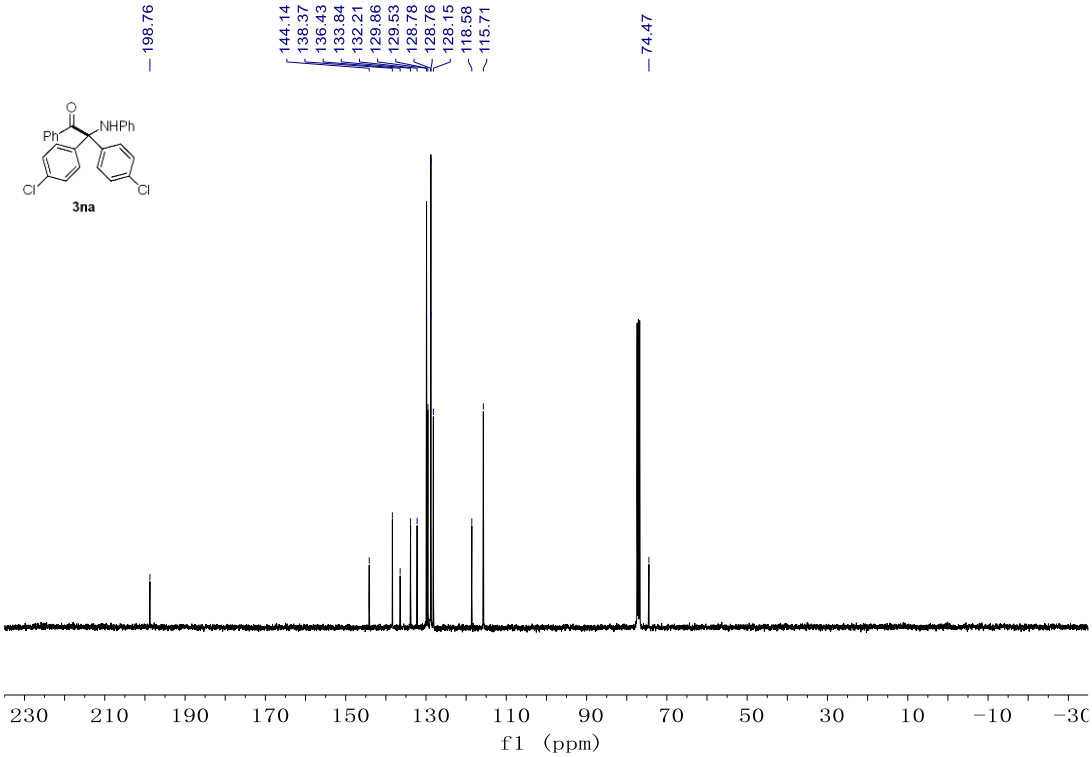
7.20
7.18
6.95
6.95
6.94
6.93
6.92
6.91
6.63
6.61
6.59
6.34
6.32
5.50
O
NHPh
Ph
Cl
Cl
3na
3.99
3.00
3.97
2.01
2.00
1.00
2.01
0.95
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)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129.53
128.78
128.76
128.15
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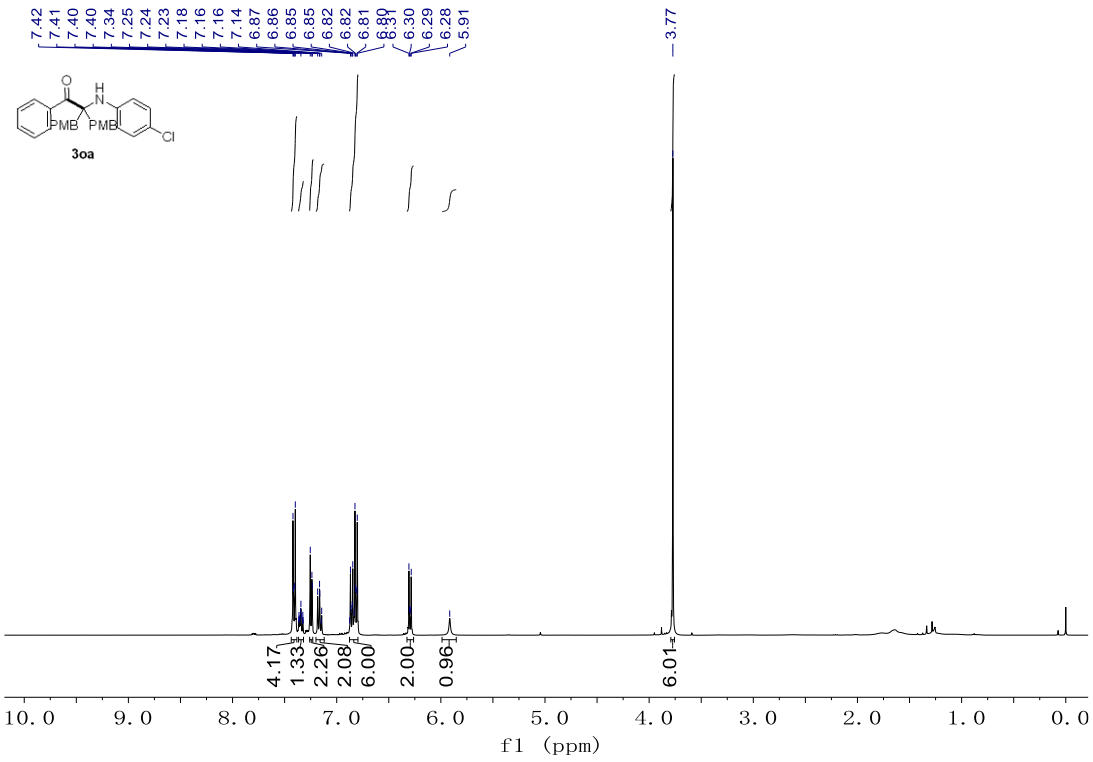
115.71
74.47
O
NHPh
Ph
Cl
Cl
3na
230 210 190 170 150 130 110 90 70 50 30 10 −10 −30
f1 (ppm)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6.86
6.85
6.85
6.82
6.82
6.81
6.80
6.30
6.29
6.28
5.91
3.77
PMB
PMB
Cl
3oa
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1.33
2.26
2.08
6.00
2.00
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6.01
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9.0
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5.0
4.0
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2.0
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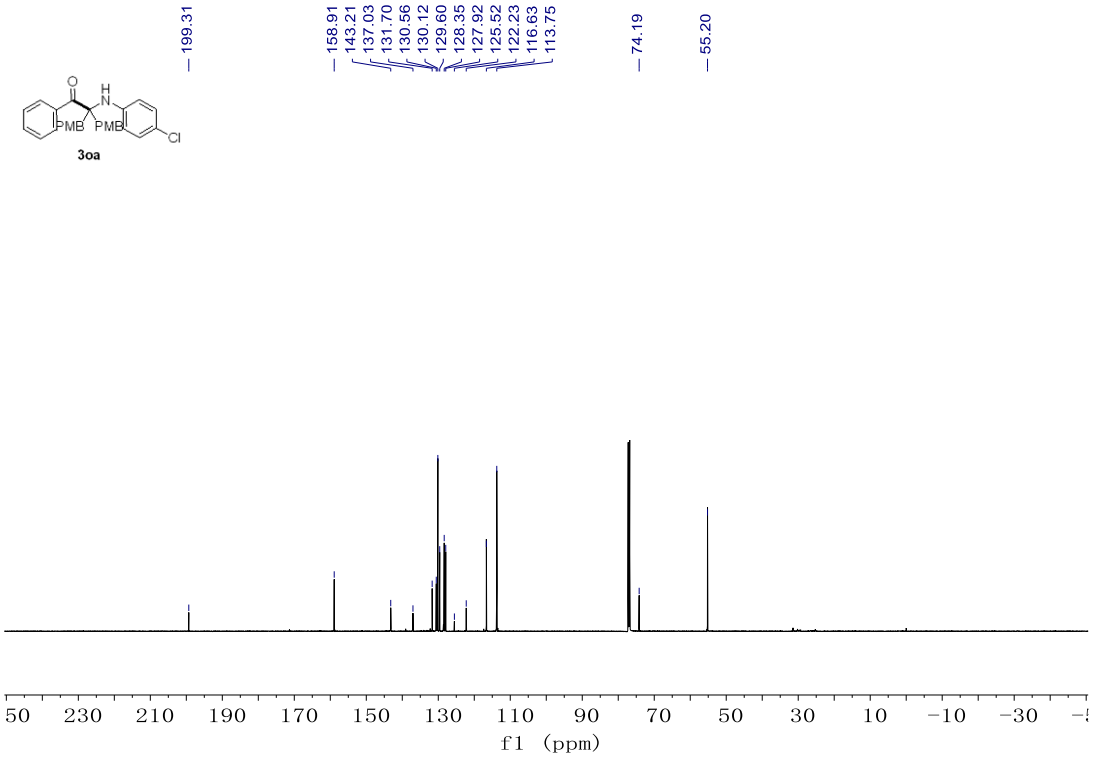
0.0
f1 (ppm)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127.92
125.52
122.23
116.63
113.75
74.19
55.20
PMB
PMB
Cl
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50
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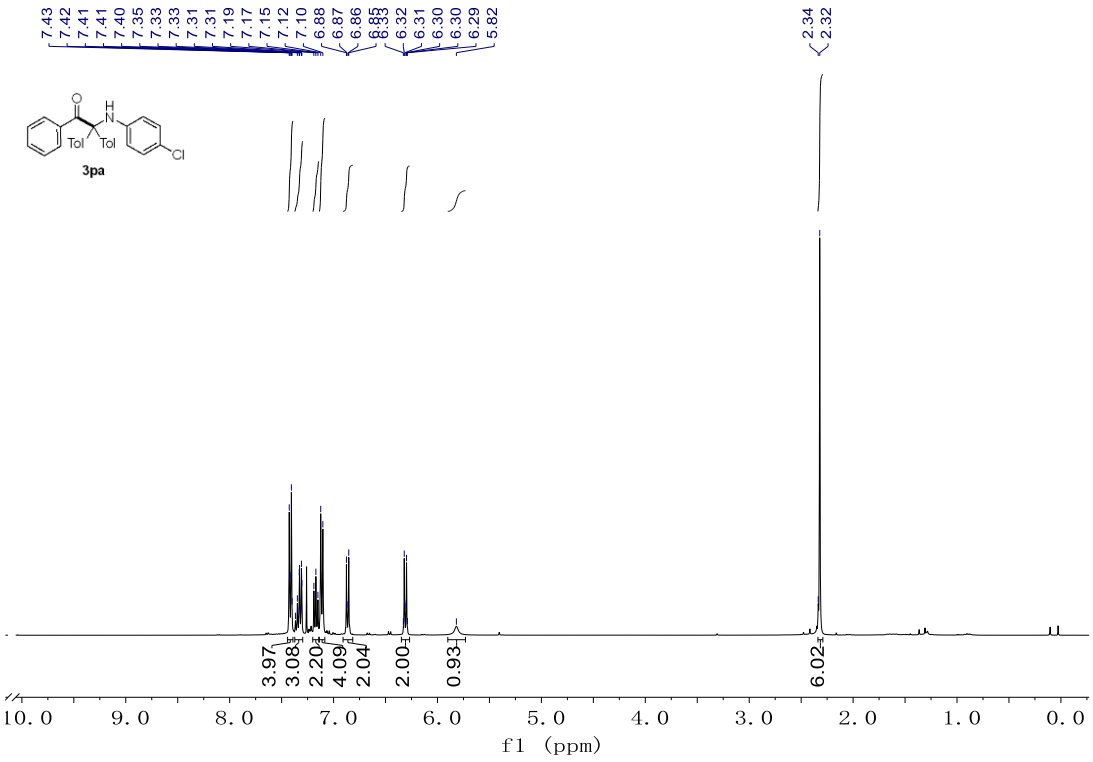
210
190
170
150
130
110
90
70
50
30
10
−10
−30
f1 (ppm)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7.10
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6.86
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6.31
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6.29
5.82
2.34
2.32
Tol
Tol
Cl
3pa
3.97
3.08
2.20
4.09
2.04
2.00
0.93
6.02
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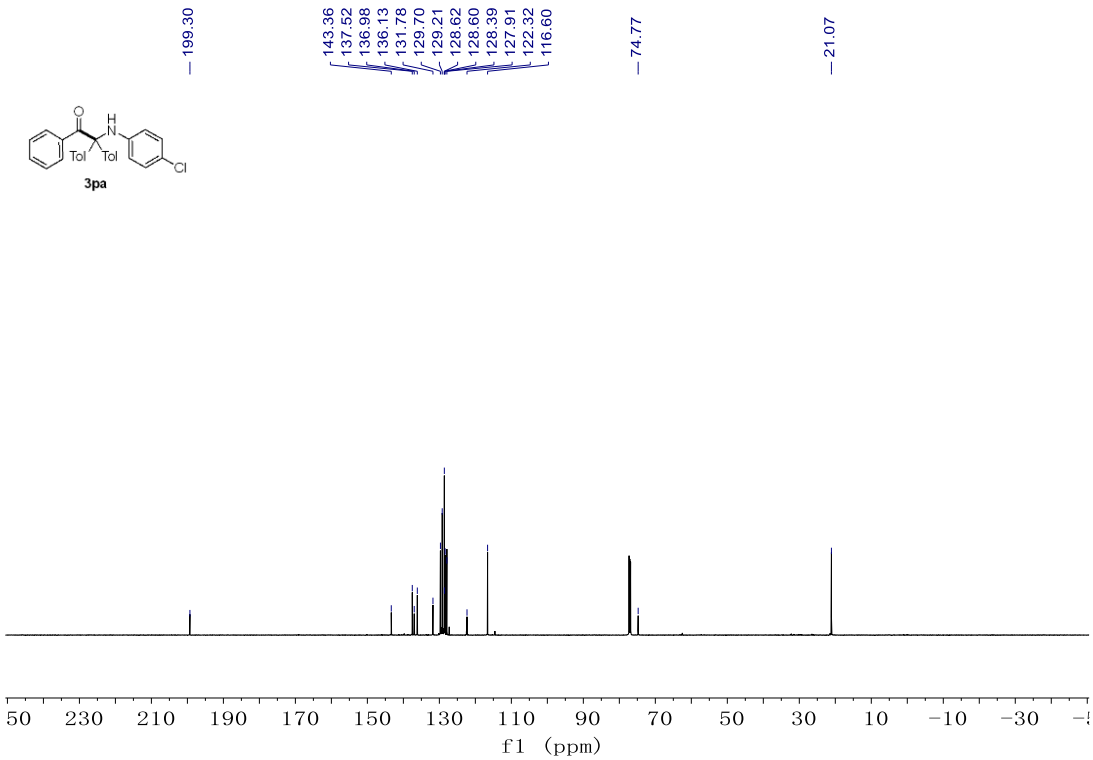
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
f1 (ppm)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128.60
128.39
127.91
122.32
116.60
74.77
21.07
Tol
Tol
Cl
3pa
50
230
210
190
170
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130
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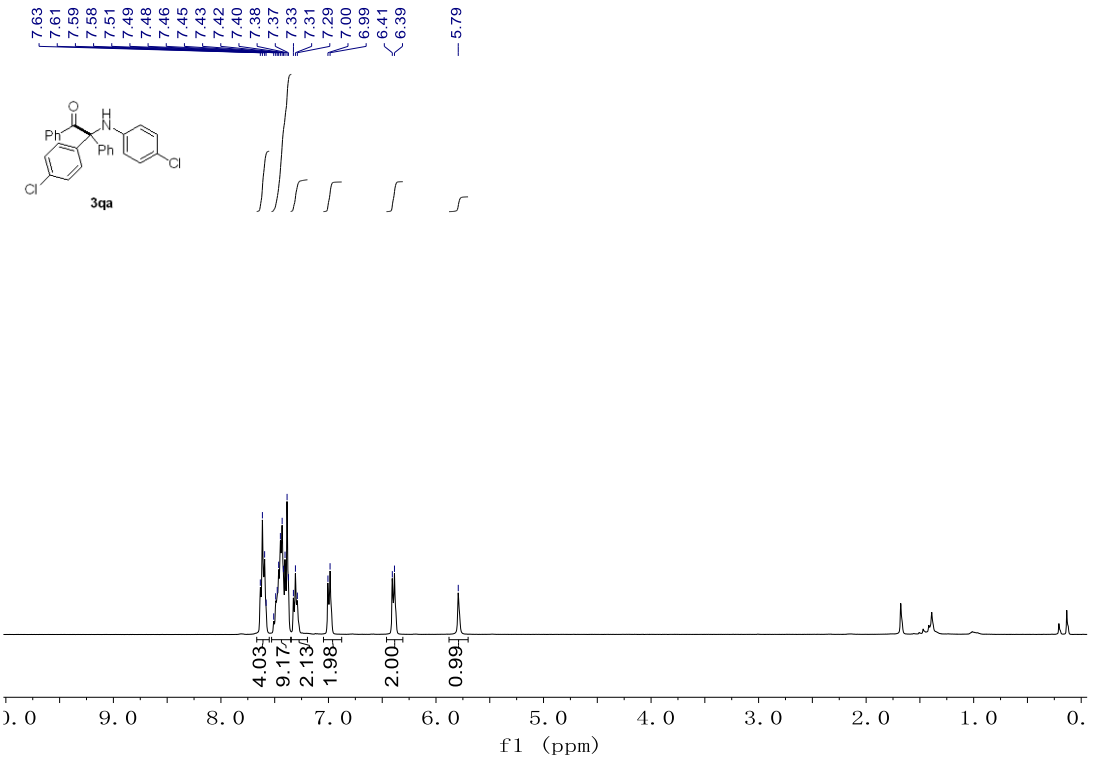
−10
−30
f1 (ppm)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7.38
7.37
7.33
7.31
7.29
7.00
6.99
6.41
6.39
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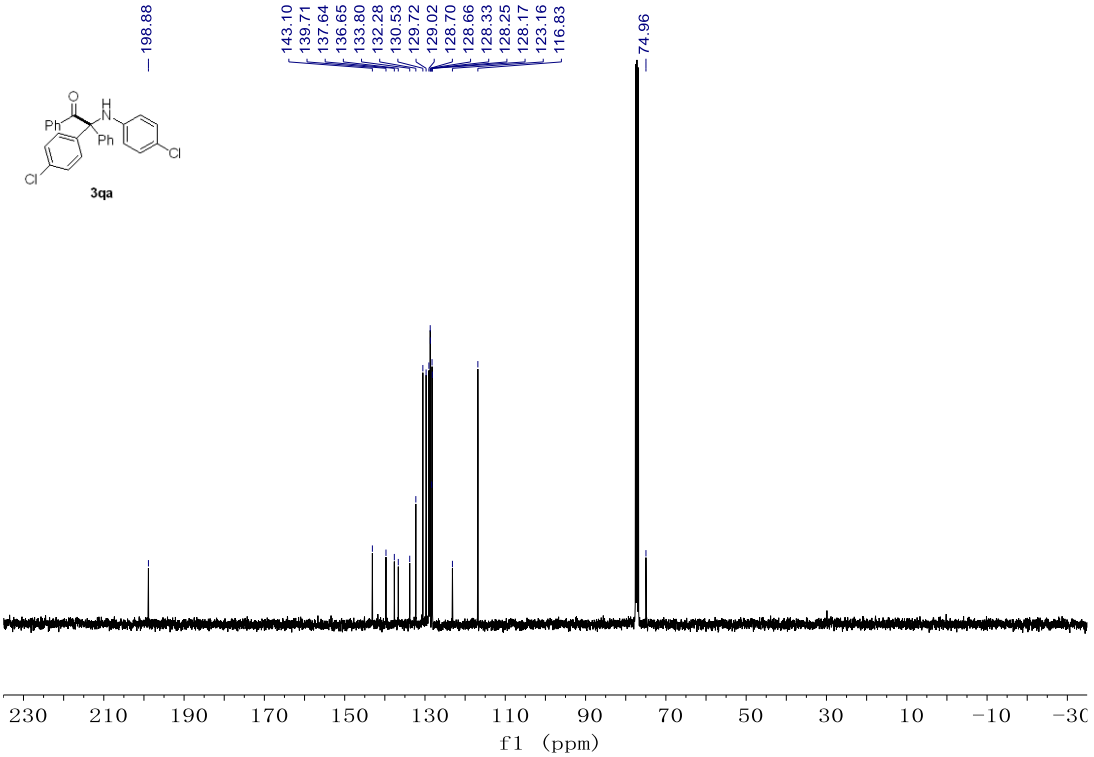
Ph
Cl
Cl
3qa
4.03
9.17
2.13
1.98
2.00
0.99
f1 (ppm)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130.53
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129.02
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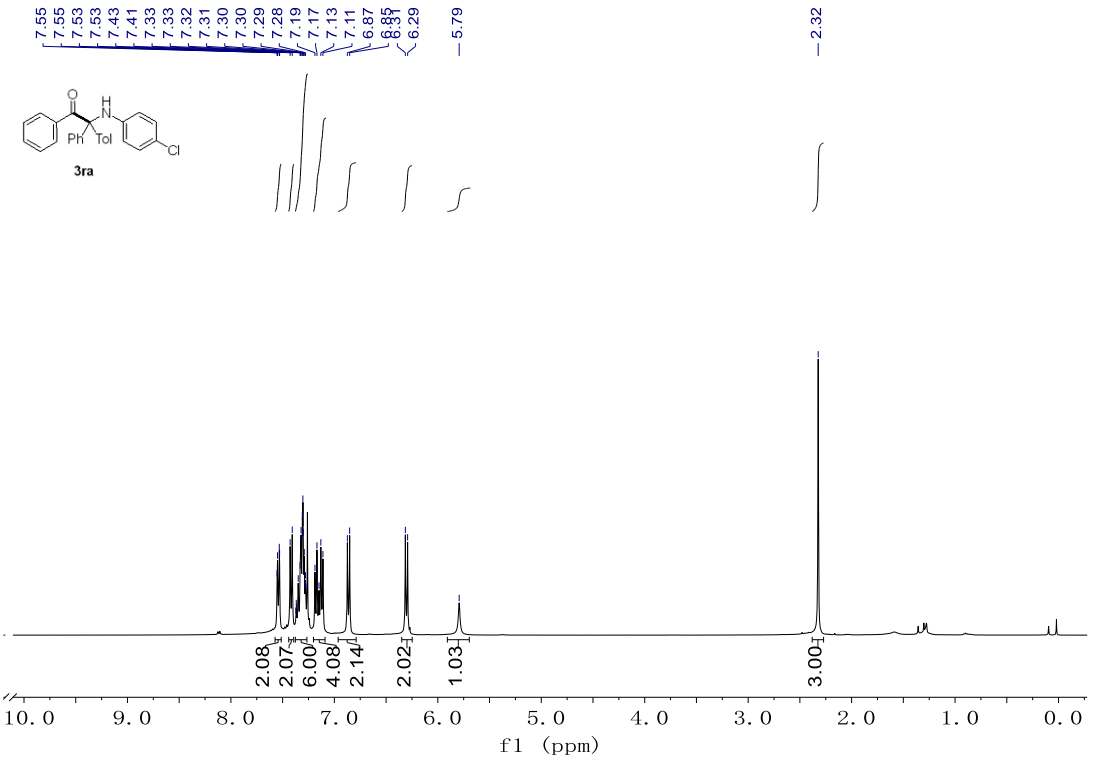
128.25
128.17
123.16
116.83
74.96
Ph
Ph
Cl
Cl
3qa
f1 (ppm)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7.33
7.33
7.32
7.31
7.30
7.30
7.29
7.28
7.19
7.17
7.13
7.11
6.87
6.85
6.31
6.29
5.79
2.32
O
H
N
Ph
Tol
Cl
3ra
2.08
2.07
6.00
4.08
2.14
2.02
1.03
3.00
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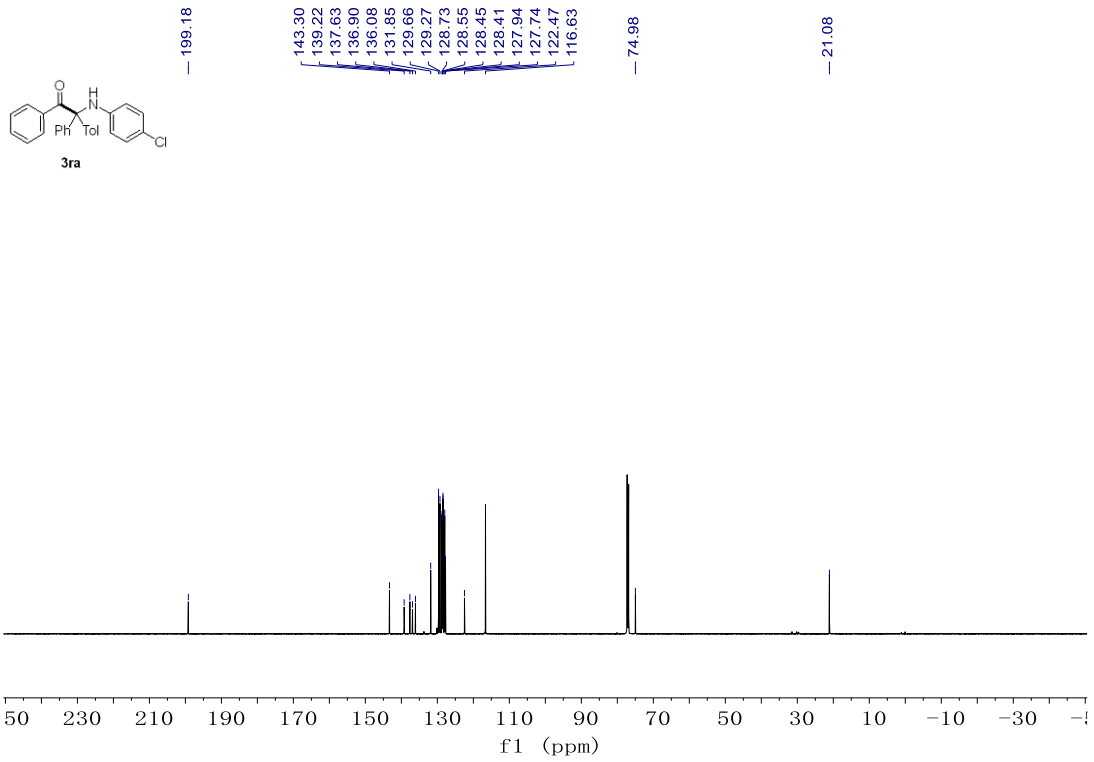
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
f1 (ppm)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136.08
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128.73
128.55
128.45
128.41
127.94
127.74
122.47
116.63
74.98
21.08
O
H
N
Ph
Tol
Cl
3ra
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210
190
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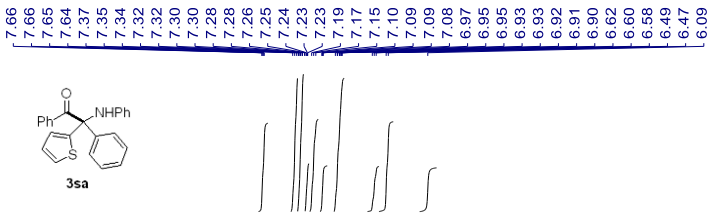
150
130
110
90
70
50
30
10
−10
−30
f1 (ppm)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7.30
7.30
7.28
7.28
7.26
7.25
7.24
7.23
7.23
7.19
7.17
7.15
7.10
7.09
7.09
7.08
6.97
6.95
6.95
6.93
6.93
6.92
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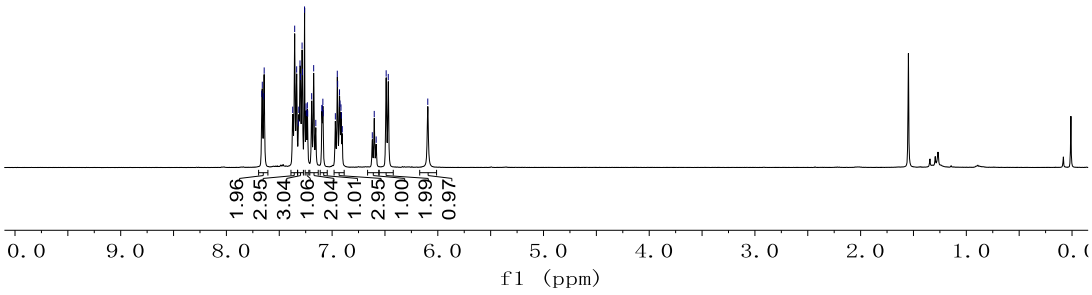
6.90
6.62
6.60
6.58
6.49
6.47
6.09
Ph
NHPh
S
3sa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1.01
2.95
1.00
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6.0
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3.0
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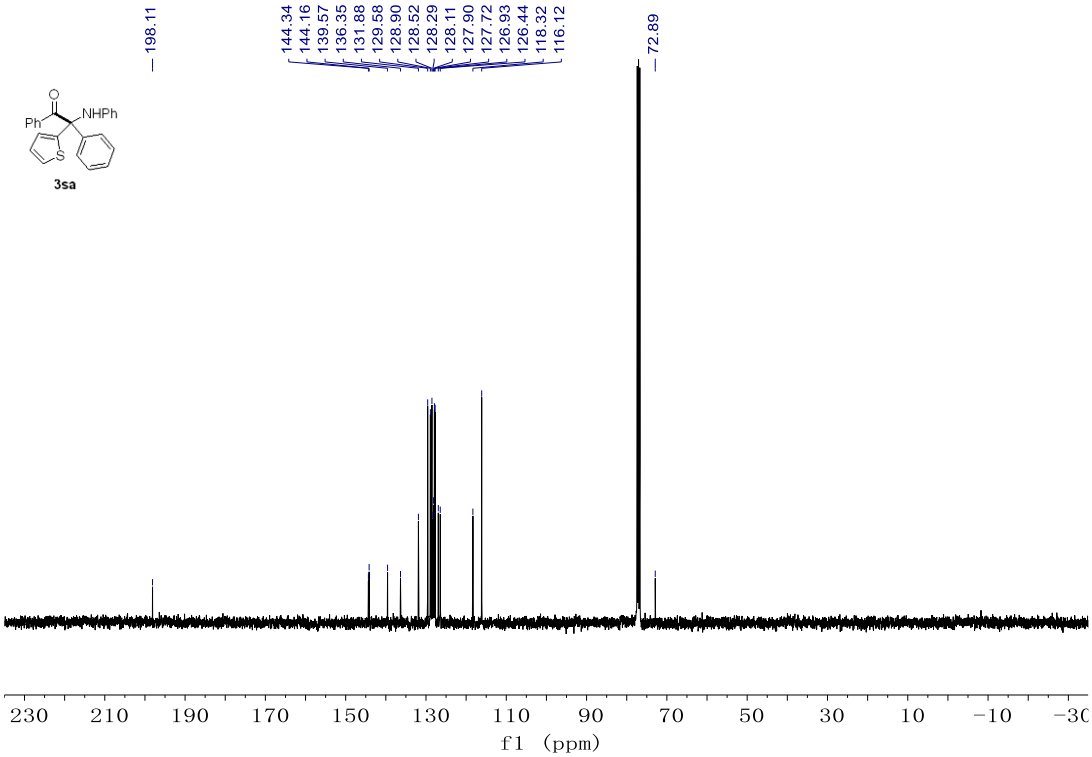
1.0
f1 (ppm)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127.90
127.72
126.93
126.44
118.32
116.12
72.89
Ph
NHPh
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3sa
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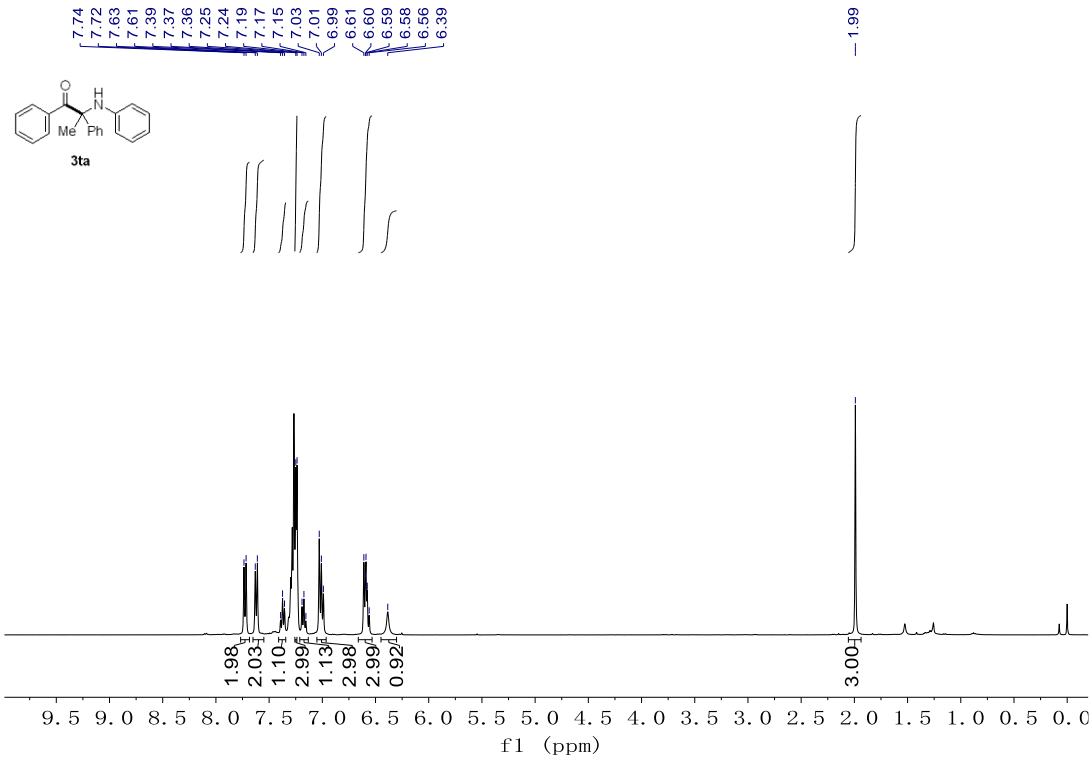
210
190
170
150
130
110
90
70
50
30
10
−10
−30
f1 (ppm)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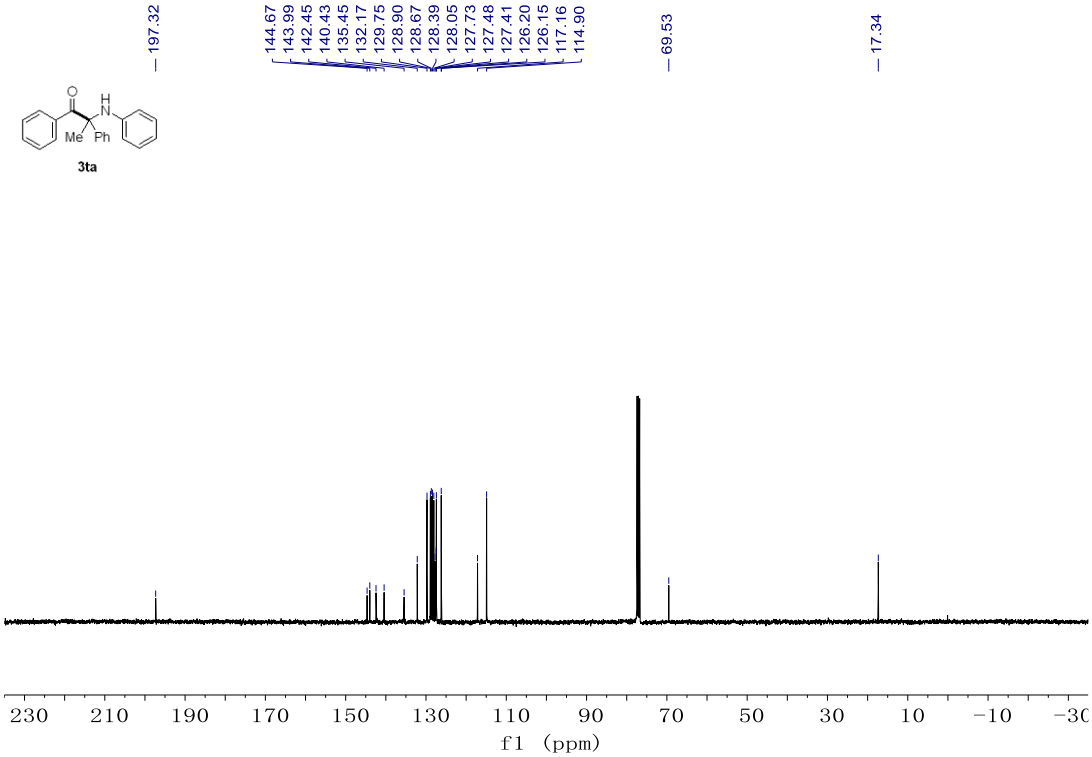
7.37
7.36
7.25
7.24
7.19
7.17
7.15
7.03
7.01
6.99
6.61
6.60
6.59
6.58
6.56
6.39
1.99
Me
Ph
3ta
1.98
2.03
1.10
2.99
1.13
2.98
2.99
0.92
3.00
f1 (ppm)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142.45
140.43
135.45
132.17
129.75
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128.67
128.39
128.05
127.73
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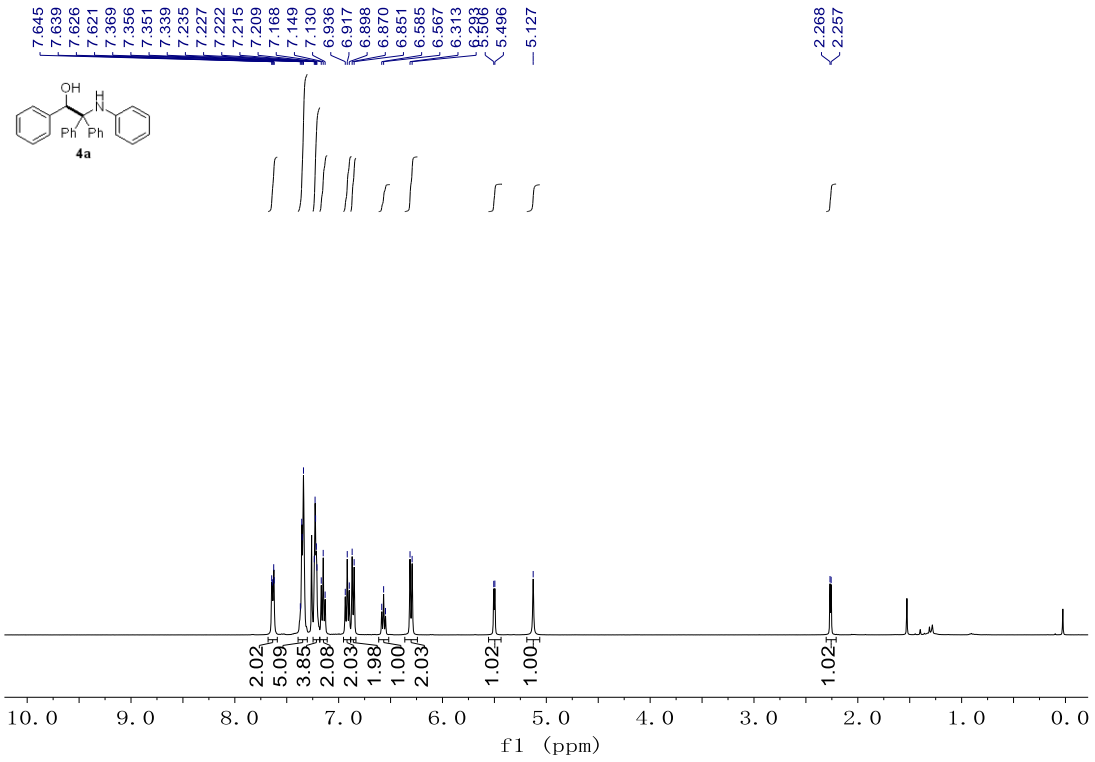
127.41
126.20
126.15
117.16
114.90
69.53
17.34
Me
Ph
3ta
f1 (ppm)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7.339
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7.215
7.209
7.168
7.149
7.130
6.936
6.917
6.898
6.870
6.851
6.585
6.567
6.313
6.293
6.288
5.496
5.127
2.268
2.257
OH
H
N
Ph
Ph
4a
2.02
5.09
3.85
2.08
2.03
1.98
1.00
2.03
1.02
1.00
1.02
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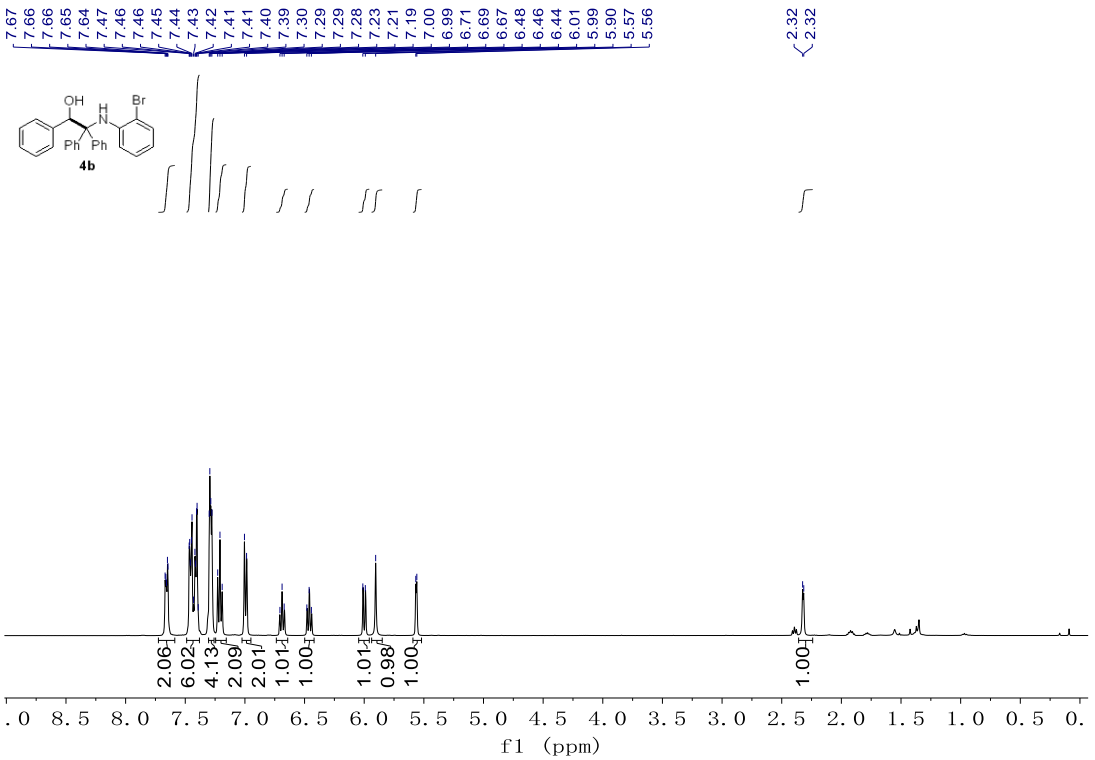
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
f1 (ppm)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7.46
7.46
7.45
7.44
7.43
7.42
7.41
7.41
7.40
7.39
7.30
7.29
7.29
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7.23
7.21
7.19
7.00
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6.71
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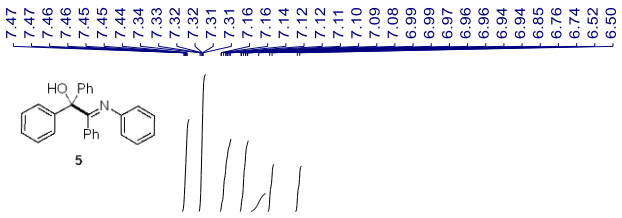
6.67
6.48
6.46
6.44
6.01
5.99
5.90
5.57
5.56
2.32
2.32
OH
H
N
Br
Ph
Ph
4b
2.06
6.02
4.13
2.09
2.01
1.01
1.00
1.01
0.98
1.00
1.00
.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.
f1 (ppm)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7.46
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7.45
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7.34
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7.32
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7.31
7.16
7.16
7.14
7.12
7.12
7.11
7.10
7.09
7.08
6.99
6.99
6.97
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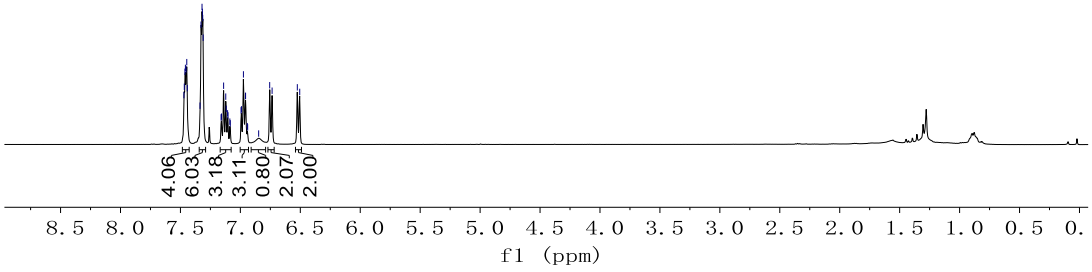
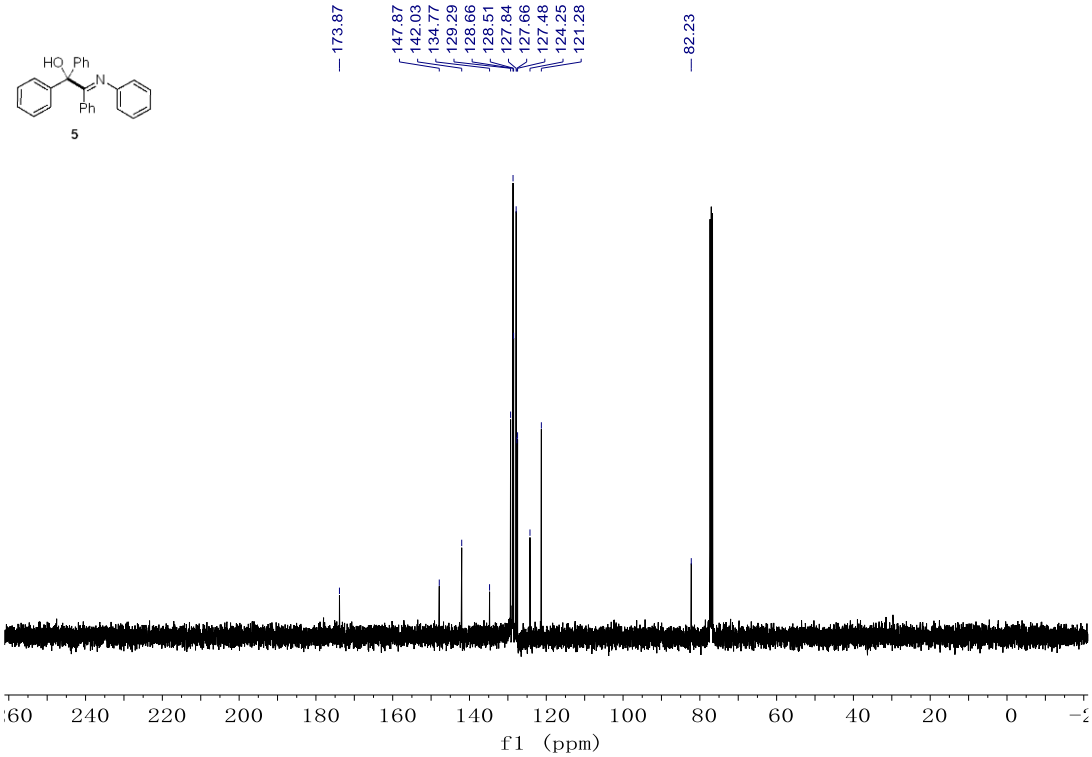
6.74
6.52
6.50
HO
Ph
N
Ph
5


4.06
6.03
3.18
3.11
0.80
2.07
2.00
8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)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147.87
142.03
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127.84
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121.28
82.23
HO
Ph
N
Ph
5
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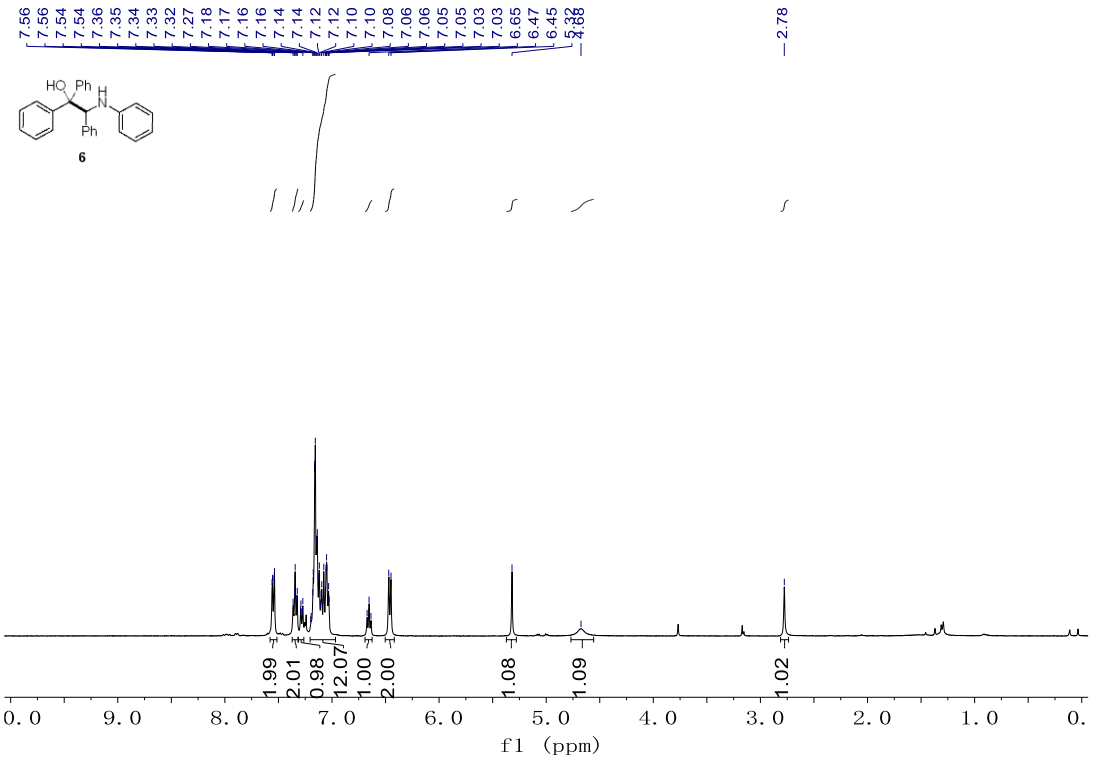
f1 (ppm)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7.56
7.54
7.54
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7.35
7.34
7.33
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7.18
7.17
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7.16
7.14
7.14
7.12
7.12
7.10
7.10
7.08
7.06
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7.05
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7.03
7.03
6.65
6.47
6.45
5.32
4.68
2.78
HO
Ph
H
N
Ph
6
1.99
2.01
0.98
12.07
1.00
2.00
1.08
1.09
1.02
0.0
9.0
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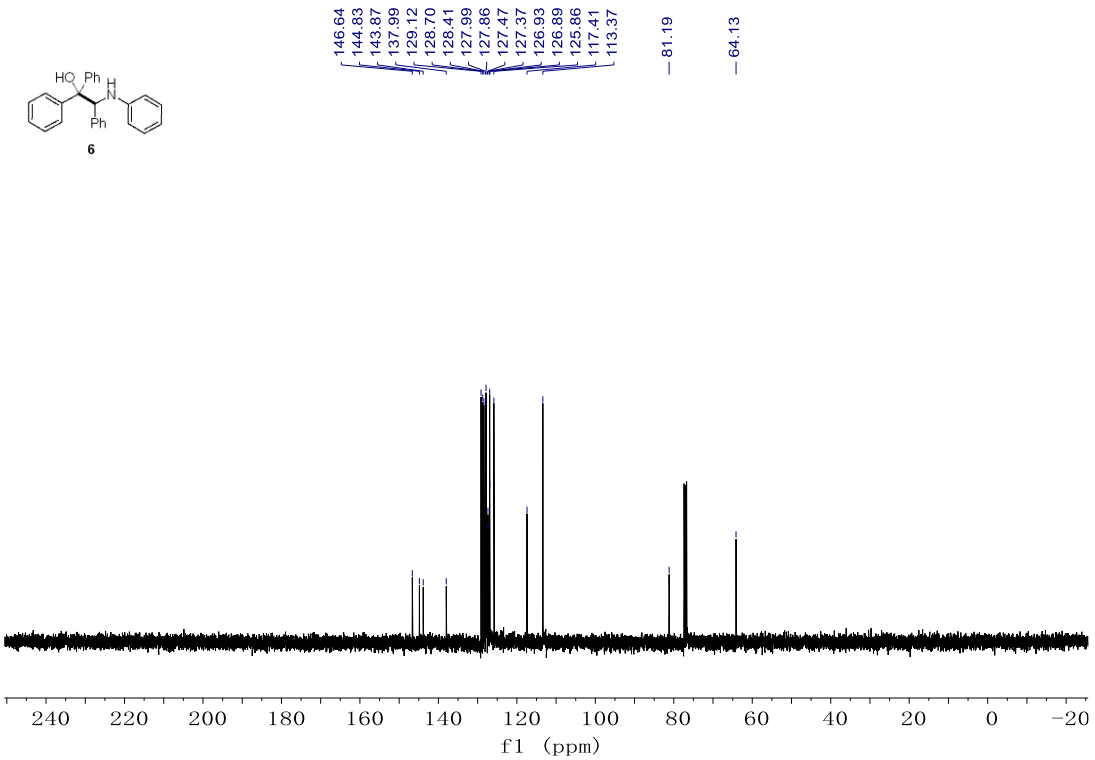
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.
f1 (ppm)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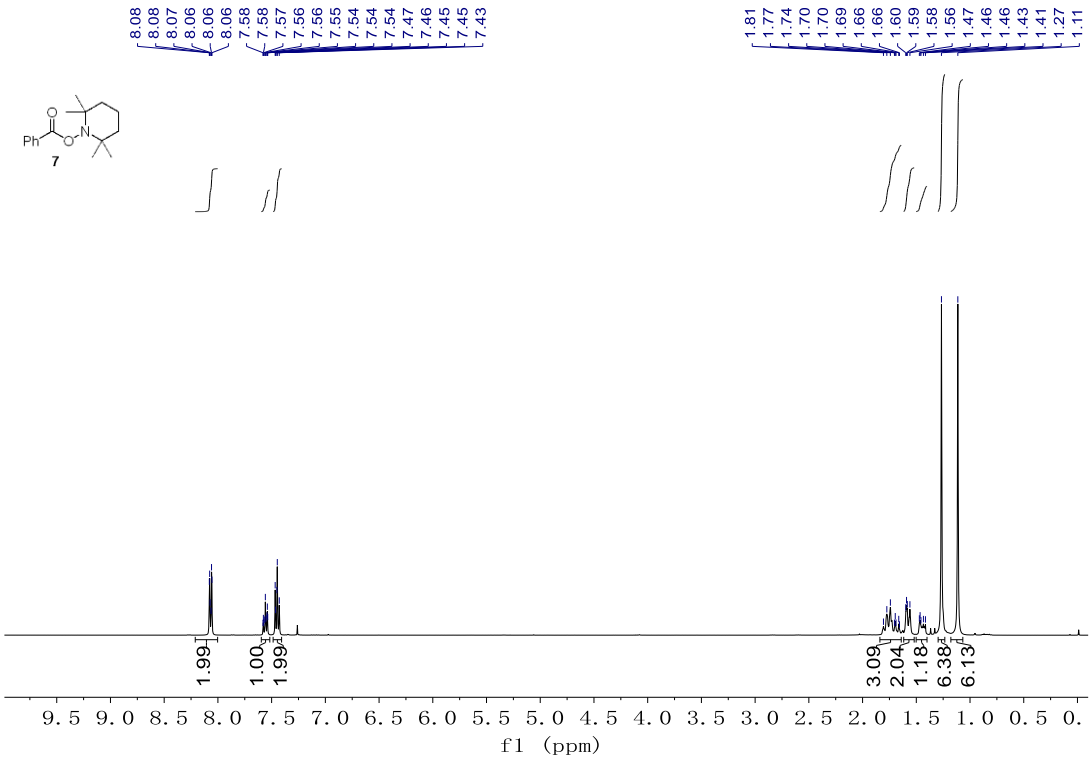
128.70
128.41
127.99
127.86
127.47
127.37
126.93
126.89
125.86
117.41
113.37
81.19
64.13
HO
Ph
H
N
Ph
6
240
220
200
180
160
140
120
100
80
60
40
20
0
−20
f1 (ppm)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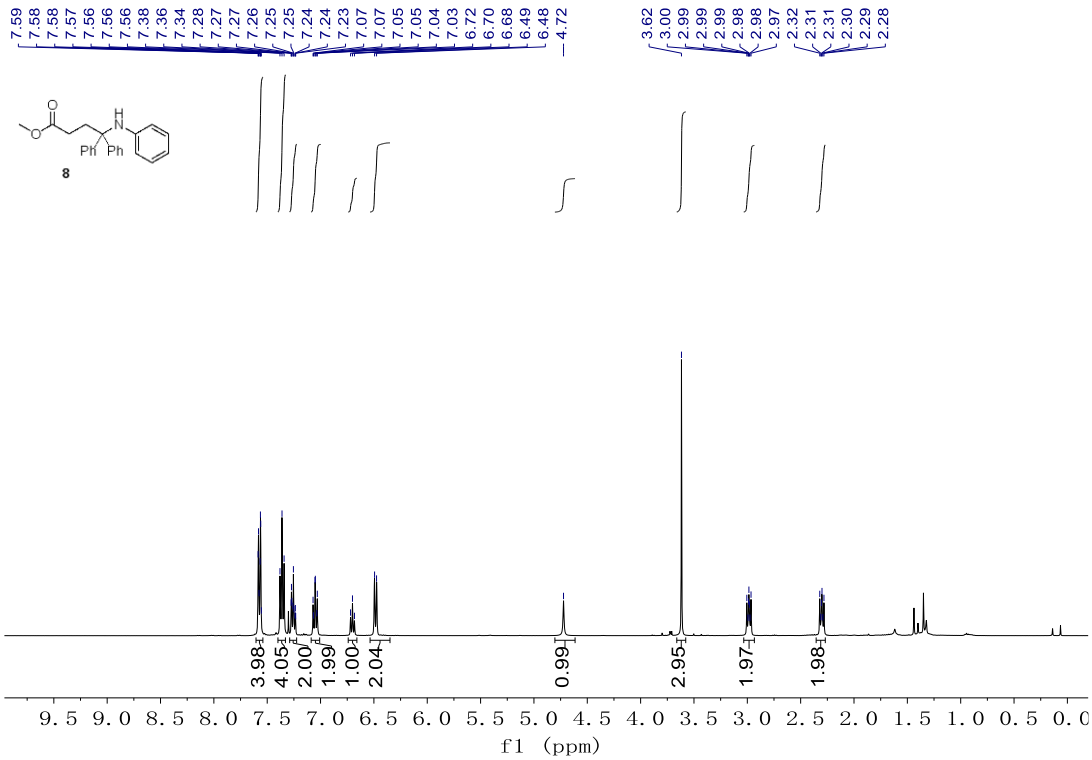
1.81 1.77 1.74 1.70 1.70 1.69 1.66 1.66 1.60 1.59 1.58 1.56 1.47 1.46 1.46 1.43 1.41 1.27 1.11
Ph
O
N
7
1.99 1.00 1.99 3.09 2.04 1.18 6.38 6.13
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.
f1 (ppm)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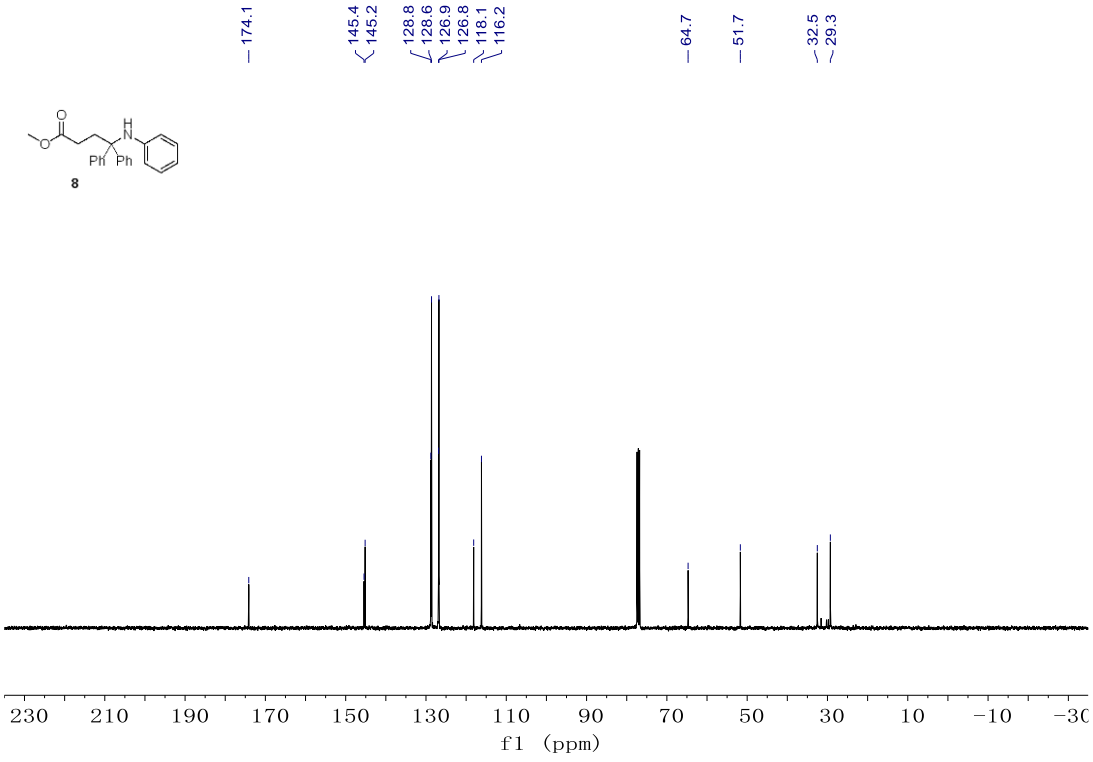
3.62 3.00 2.99 2.99 2.99 2.98 2.98 2.97 2.32 2.31 2.31 2.30 2.29 2.28
O
N
H
Ph Ph
8
3.98 4.05 2.00 1.99 1.00 2.04 0.99 2.95 1.97 1.98
9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0
f1 (ppm)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145.4
145.2
128.8
128.6
126.9
126.8
118.1
116.2
64.7
51.7
32.5
29.3
O
O
H
N
Ph
Ph
8
230
210
190
170
150
130
110
90
70
50
30
10
−10
−30
f1 (ppm)